KNITTING ARTS EXHIBITION NUMBER

AMERICAN

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41st Knitting Arts Exhibition to Open April 27

THE 41st Knitting Arts Exhibition, to be held April 27 through May 1 at the Atlantic City, N J, Auditorium, is expected to attract considerably more than 10,000 visitors with a mammoth display of exhibits pertinent to the hosiery, outerwear, fabrics and gloves industries.

As the first biennial show following the recent merger of the Knitting Arts Exhibition and the Knitting and Allied Crafts Exhibition, the 1953 exposition will be under the co-sponsorship of the National Association of Hosiery Manufacturers, the National Knitted Outerwear Association and the Underwear Institute. The combination of effort is obviously designed to give the knit goods producer a bigger and better show while offering exhibitors an opportunity to display their machinery, supplies and services to the mill owner in one week's time under one roof.

Two hundred and nine exhibitors have contracted for space thus far, rivalling the figure set at the 1951 Exhibition.

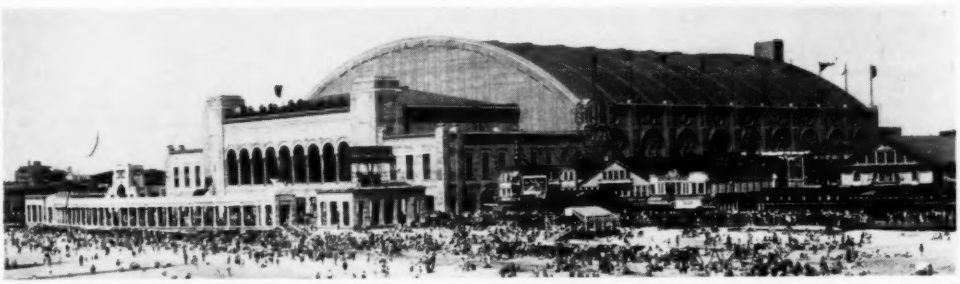
Tickets may be secured from exhibitors or from the exhibition management headed by Albert C Rau, 332 Park Square Building, Boston, Mass.

The AMERICAN DYESTUFF REPORTER will be located in Booths 120-121 (Howes Publishing Co, Inc) and the staff extends a most cordial invitation to visit, to discuss aspects and problems of wet-processing and testing or merely to relax after a lengthy tour of the exhibit area.

It is felt that the descriptions and listings of personnel in attendance at the exhibits listed on the following pages will be of primary interest to our readers.

SHOW HOURS

Monday, April 27	12 Noon to 6 PM
Tuesday, April 28	12 Noon to 10 PM
Wednesday April 29	10 AM to 6 PM
Thursday, April 30	10 AM to 6 PM
Friday, May 1	10 AM to 1 PM



ATLANTIC CITY AUDITORIUM

Site of the 41st Knitting Arts Exhibition

EXHIBIT AREA

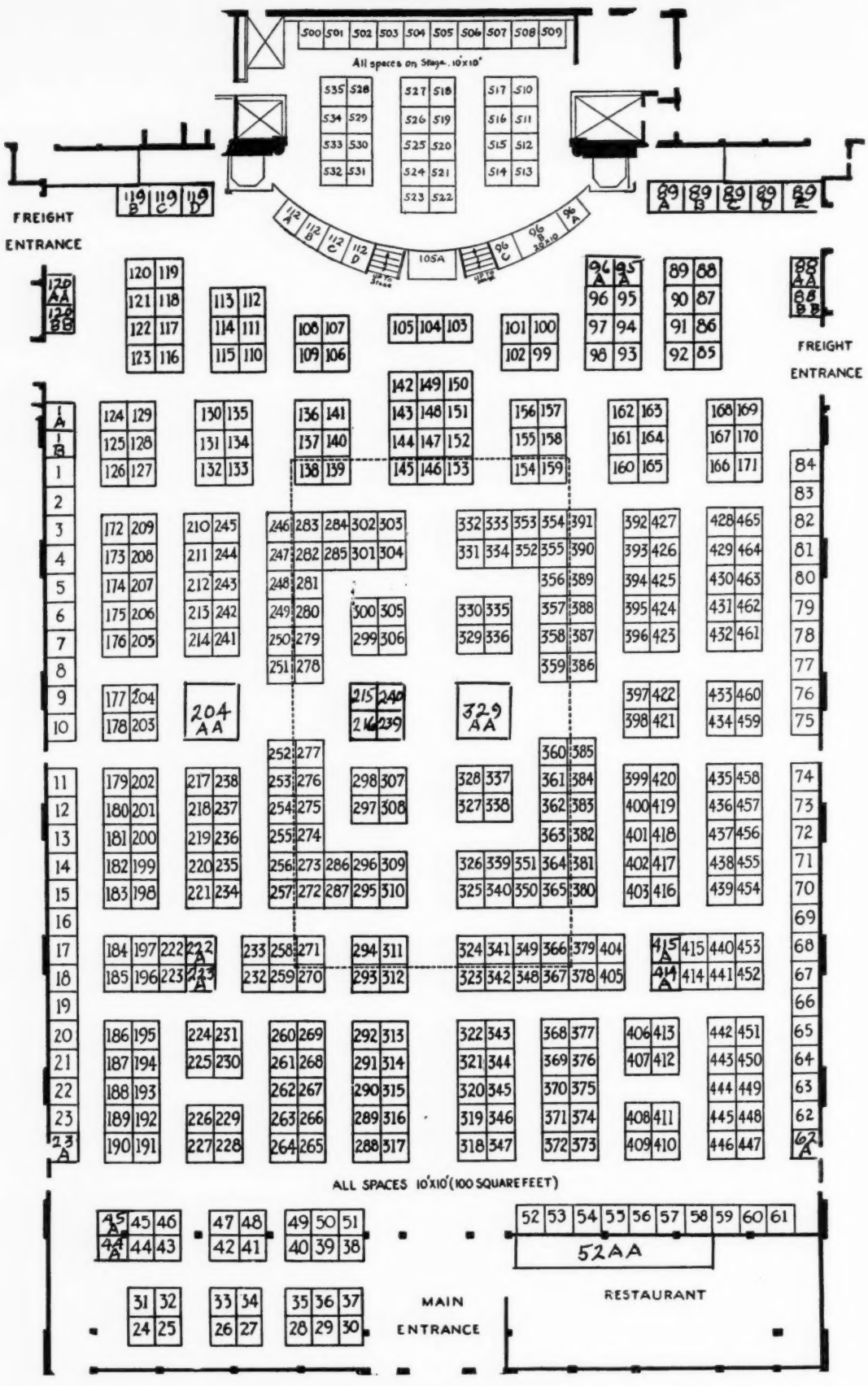


EXHIBIT DESCRIPTIONS

Air-Perme-Ator Mfg Co

Booths 119A, 119B, 119C
300 Preakness Ave, Paterson, N J

On display: Dry humidification units for humidification, air washing, heating and cooling.

In attendance: Edward Kohut, Richard G Burr, Pierre M Heuzey and Tom E Lucas, Southeastern representative.

Amalgamated Chemical Corp

Booth 25
Ontario & Rorer Sts, Philadelphia, Pa

On Display: Dynadye V, a dyeing agent for Dacron; Dynadye DA, a dyeing agent for Dacron and other fibers; finishing agents for piece goods of all kinds; products comprising the Siddons process, a one-bath scouring and dyeing process; hosiery finishes and a special group of plasticized resin emulsions.

In attendance: Harold B Dohner, president; Robert A Bruce, vice president; John M Jester, Jr, secretary; Robert N Pennie, research director; Charles E Seel, George C Harkins and John C Crane, representatives.

American Aniline & Extract Co, Inc

Booth 212
Venango & F Sts, Philadelphia, Pa

On display: Aquacel, a film-forming antistatic agent for synthetic yarns and cellulose fibers; Daycryl I, a film-forming resin for Dacron; and Orthosize, a polyvinyl size for nylon wet-processed yarns.

In attendance: William J Duddy, president; R D McCarty, vice president; Martin H Silberman, technical director; Lynn Kippas, sales representative and James H Jones, Southern sales representative.

Cummings Landau Laundry Machinery Co, Inc

Booths 524-525 (stage)
305 Ten Eyck Street, Brooklyn, New York

On display: A washing unit especially made for use in the knitwear trade, consisting of a 36" x 54" 2-compartment all stainless steel washer, a 30" all stainless steel extractor, and an open-end reversing type drying tumbler with glass observation door, will be shown.

In attendance: Eugene Cummings, Assistant Secretary; Morris Landau, Treasurer; and David Green and F Mass, Salesmen.

W F Fancourt Co

Booths 371-372
516-518 S Delaware St, Philadelphia 47, Pa

On display: Vibralon finish, which is said to impart great snag resistance to nylon full-fashioned hosiery used with a combination of Fanco resins and nylon 8 type salt together with delustering compounds; various denier nylon hosiery, synthetic fiber knit and woven fabrics treated with Fanco finishes; resin finishes, scours, softeners and waterproofing compounds for piece goods.

In attendance: W F Fancourt, Jr, president; W F Fancourt, III, vice president; John L Fancourt, secretary; Thomas Lindley, sales representative; and Claude Wolff, chemist.

Fletcher Works, Inc

Booths 428-430
Glenwood Ave & Second St, Philadelphia 40, Pa

On display: The Fletcher Junior Extractor (a popular 30" centrifugal extractor), the Fletcher King Spool Twister, Fletcher Speedex Winder, and Fletcher Master Duplex Doubler Twister.

In attendance: W H Rometsch, secretary-treasurer; Charles W Moore, vice president; T B Baldridge, Jr, sales engineer; Harold D Cupit, sales engineer; J D Harrison, sales engineer; W W Egee, chief engineer; and H V Roessell, engineer.

Foster Machine Co

Booths 28-30, 35-37
Westfield, Mass

On display: The Model 102 winding various yarns on dyetubes and cones; a new surface-drive constant speed take-up spindle for filament yarns; the Model 75 winding cones and dyetubes; the Model 76 nylon sizing machine; the Model 78, 10" traverse precise wind machine; and the Foster-Muschamp Autofill machine winding knitting caps for decorative yarns for hosiery machines.

In attendance: W C Chisholm, president and treasurer; E C Connor, sales manager; H W Ball, chief engineer; H E Swift, J B Davenport, E P Dodge, G W Mallory and H W Cadle, salesmen; F F Stange; E R Davis, Engineering Dept; H L Muschamp, managing director of Muschamp Taylor Ltd, Foster's European representatives.

Ginsberg Machine Co, Inc

Booths 433-434, 459-460
224 Fifth Avenue, New York 1, N Y

On display: The Waltees* Miniature Calendar for giving cloth final shrinkage as it is being laid and eliminating variations in cloth dimensions occurring after shrinkage. The Waltees generates its own steam and has its own water supply. Operates on 110V or 220V. Stainless steel. Reportedly can be used on any knit goods spreading machine.

In attendance: William R Lieberman, Si Margolis, Stanley Krantz, Phil Harris and Harold Stout.

* Reg.

Indianapolis Chemical Co, Inc

Booth 198
528 N Fulton St, Indianapolis, Indiana

On display: Nylon trough solution, boarding form cleaner, knitting oils, B-1 nylon cleaning solution, B-1S nylon cleaning solution, B-1X nylon trough solution, B-4 nylon cleaning solution.

In attendance: H T Smolenski, chemist and vice president; J L Thibodeau, sales representative.

Industrial Dryer Corp

Booths 73, 74
432 Fairfield Ave, Stamford, Conn

On display: "H-W" conditioner for presetting nylon hosiery.

In attendance: P H Friend, F W Caesar, J R Tutt and W H Truesdale.

C P Kaler Co

Booth 89E
100 E 7th St, Lansdale, Pa

On display: Dye nets of 100% spun viscose rayon, half cotton and half rayon, all cotton, and muslin.

In attendance: Clifford P Kaler, president; Paul Kaler; Robert Schneck.

Kali Manufacturing Co

Booth 69
427 Moyer St, Philadelphia, Pa

On display: Various Kalpinols for trough solutions for knitting of nylon; water repellents; wetting and dispersing agents for package, skein and piece dyeing; Kalepon, an agent used in kier boiling, dyeing and bleaching cotton and rayon knit goods; Kalifix, a dye-fixing agent for knit goods; Hydroxy Softeners GS and N, which are applied in the last

rinse in tub, padder or Tube Tex machine to give a full soft hand; Kalepon "W," a protective agent for scouring and dyeing of wool sweater yarns, cashmeres, etc; Slozit, a vat dyeing agent for cotton and rayon jersey dyed in rope form; and other softeners for polo shirts, tee shirts, jerseys, etc.

In attendance: Samuel G Davenport, president; James A Branegan, vice president; Martin W Mueller, assistant to president; Ray J Schadewald and John Gilroy, salesmen.

Kearny Manufacturing Co, Inc

Booths 86-87
681 Schuyler Ave, Kearny, N J

On display: Surco-Set Yarn Conditioning Equipment as installed on commercial Foster and Universal winders; moisture-reading textile psychrometers.

In attendance: H E Kresse and E W Ercklentz, vice presidents; P J Sturzenegger, chief chemist; Kops Associates, representatives.

A Kimball Co

Booth 287
307 W Broadway, New York, N Y

On display: The following marking systems: Motor Kimco for string tags and folding pin tickets; Label Marker for all types of cloth and paper sew-in labels; Model R which prints special types of pin tickets; Midget Marking System, both hand and motor, which prints Kum Kleen labels, gum labels, Kimflex and pin tickets.

In attendance: L J Waters, J C Quinn, J P McGuire, T R Spencer, F Brady and T Odom.

Laurel Soap Mfg Co

Booths 228, 229
Tioga and Thompson Sts, Philadelphia, Pa

On display: Conditioning emulsions; winder trough solutions for cotton, spun rayon, nylon and blends; coning oils for treating Orlon, nylon, Dacron, Acrilan, acetate and blends; sizes for monofilament hosiery yarns; hosiery boil-off compounds; hosiery finishes for nylon, Dacron and blends; and package dyeing assistants and finishes.

In attendance: Clarence E Bertolet, president; William H Bertolet, Jr, treasurer; A Henry Gaede; Fowler Jackson; William H Bertolet, 3rd; Thomas C Holst and Albert H Rant.

Leatex Chemical Co

Booths 506 and 507
2722 N Hancock St, Philadelphia, Pa

On display: Chemical specialty products.

In attendance: William Brink, L Kevin McChesney, Joseph A Clark, John F Rieder, John McChesney, Jr, H Higginbotham, Harry Buckley, Charles L Hammell, John McChesney, Sr, and Maurice M Guertin.

Lydon Brothers, Inc

Booths 45, 46
85 Zabriskie St, Hackensack, N J

On display: Truck loading hosiery presetter with a combination of electric and steam heat under control of precision type automatic timing and temperature control equipment. This presetter will have an exhausting system for exhausting vapor from the loading chamber at the end of the elapsed time.

David Maimin & Co

Booths 114, 115
633-35-37 Arch St, Philadelphia, Pa

On display: Notching machine for knit goods, portable steam electric pocket creaser, sectional steel cutting table with a Duron top, fully automatic steam electric boiler capable of handling five steam irons, and a spreading machine for lace.

In attendance: David Maimin, A M Maimin and Ed Kelly.

Markem Machine Co

Booths 329, 330 and 335, 336
150 Congress St, Keene, N H

On display: Industrial marking machines: hosiery welt printer, box printer, pressure sensitive tape printer; label printers.

In attendance: Harold D Milton, field sales manager; and the following technical representatives: C H Cheeseman, H E Clark, Gilmore Fretz, E R Lane, J S Remmel, and Robert C Mensel.

National Association of Hosiery Manufacturers

Booth 105A
468 Fourth Ave, New York, N Y
Reception booth.

In attendance: W F Williamson, president; R C Ball, secretary; and M C Kurtz, assistant secretary.

National Knitted Outerwear Association

Booth 105A
386 Fourth Ave, New York, N Y

Reception booth.

Onyx Oil & Chemical Company Onyx International

Booths 210, 211
190 Warren St, Jersey City, N J

On display: Samples of hosiery illustrating the advantages of presetting nylon by the "Dip" system and chemical specialties, including the new Nylonyx DS—a single product for preparing the dipping solution. Nylonyx, a liquid at room temperature, is said to contribute to the economy of the "Dip" system outstanding through its emulsifying and suspending properties.

In attendance: S J Singer, vice president, International Division; Leon P Brick, vice president; Albert R Jenny, general sales manager; Edward A Yzewyn, general manager, International Division; Alexander C Mackey, director, Industrial Division; R Raas, treasurer, International Division; Emil W Peters, director, Hosiery Division; R Allen Watson, J Walter Huber and Clifford R Smith, sales representatives.

Paramount Textile Machinery Co

Booths 284-285, 301-304
131 S Wabash Ave, Chicago, Ill

On display: Paramark transfer machine, presetter junior, hosiery drying forms and table, other hosiery finishing equipment.

In attendance: Henry Pope, Jr, president; William Pope, vice president; John C Fenley, sales manager; W H Albertson, O A Siegel, L D Ross, W E Pike and L J Albertson, sales representatives; H Richter, G E Dunn, H Campbell, J Jarvis and F Snogren.

Joseph Pernick Co, Inc

Booth 199
5419 Flushing Ave, Maspeth, N Y

On display: Knit goods calendar, measuring and examining machine.

In attendance: Louis Pernick, David Pernick, David Haft, Elaine Orliss.

Philadelphia Dye Works

Booth 185
G and Wyoming Sts, Philadelphia, Pa

On display: Dyeing of wool and worsted yarns and synthetics; raw stock dyeing; top dyeing; and shrinkproofing of wools.

In attendance: L H Mason, president; J R Shoch, assistant secretary and treasurer; W E Knipe, vice president; and Thomas O'Donnell.

Philadelphia Metal Drying Form Co, Inc

Booths 103, 104, 105
4550 Torresdale Ave, Philadelphia 24, Pa

On display: The "Philadelphia Air-Flow," a Hi-Temp Intensifier drying form table which is designed to permit a full free flow of air around all forms at all times; non-adjustable solid forms; adjustable toe forms; multishape forms and attachments; and other models of steam and electric drying tables.

In attendance: Joseph Seligman, president; Thomas A Temple, vice president; and Joseph Pistilli.

Proctor & Schwartz, Inc

Booths 188 through 193
7th St and Tabor Rd, Philadelphia, Pa

On display: A new preboarding machine for nylon hosiery; tray dryer for women's nylon hosiery; Con-o-Matic slack washer for handling tubular knit fabrics; films of the Redmanized process.

In attendance: Charles S Tiers, William Merrigan, William Poole, Thomas Mahan, Parke Schaffer, Denver Cunningham, G W Schwartz IV, and Myron T Fleming, vice president, Dryer Division.

Richmond Oil, Soap & Chemical Co, Inc

Booth 117
1041 Frankford Ave, Philadelphia, Pa

On display: Rosopen #20, penetrant for dyeing, especially in package machine; Lubro #20, for lubricating machines knitting Orlon or other synthetics; Rubberknit, for knitting uncovered rubber thread; Ronyl Finish S-936, combination of finish, duller and board lubricant; Lubknit, for half hose; Rosimerse, scouring agent.

In attendance: William Alkus, vice president; Morton W Levi, chemical engineer; John W Schenkel, textile chemist; and the following salesmen: James W Lederer, Henry M Rubin and William Kamarek.

St Regis Sales Corp

Booth 522
230 Park Ave, New York, N Y

On display: Laminated phenolic plastics, sheets, rods, tubes, injection molded items, fabricated specialties for the textile trade, such as high-strength plastic bobbins, pirn caps, take-up tubes, sizing tubes.

In attendance: D F Sweet, sales manager; John Zeier, assistant sales manager; and the following sales representatives: Fred Delnevo, Harry Titus, Joseph T Murphy, Dwight Davidson.

Scholler Brothers, Inc

Booths 232, 233, 258, 259, 270, 271
Collins and Westmoreland Sts, Philadelphia, Pa

On display: New "Dura-Septic HT," which is said to impart antiseptic properties to all fibers and to have high resistance to laundering; Dura Beau "Hysorb" wash-resistant finish, for imparting quick wettability and increase moisture absorption to nylon and other synthetic fibers. Regular textile soaps, softeners, oils and finishes and fabrics treated with same.

In attendance: F C Scholler, president; E S Atkinson, L M Boyd, E J Fitzgerald, Jr, J O Sweitzer, J F Noble, W A Daniels, C W Jones, William Jackson, Jr, and W R Sargent, salesmen.

Scott Testers, Inc

Booth 357
101 Blackstone St, Providence, R I

On display: The New Scott "Accr-O-Meter" Weighing System, as applied to convert a Scott Model J Tensile Tester for Constant-Rate-of-Extension testing; the New Clemson Bundle Fiber Tester, a motor-driven recording tester giving permanent records of the strength of bundles of fibers; X5 "economy" single and tensile tester for knitting yarns; and Scott Twist Counter with lens to magnify yarn diameter only.

In attendance: Harold W Horton, John E Hargreaves and David C Scott, Jr.

Shell Oil Co

Booths 83, 84
50 W 50th St, New York, N Y

On display: Shell Vexella oils, Shell special process oils for textiles, Shell Alvania grease.

In attendance: R M Cokinoa, industrial lubricants manager, New York division; L W Catling, W E Miller, B J Davis, J G Gilmore, and R E Purinoon.

Smith, Drum & Co

Booths 52 through 61
432 Allegheny Ave, Philadelphia, Pa

On display: Dyeing, drying and finishing machinery.

In attendance: Harry S Drum, president; R N Smith, vice president; W C Dodson, assistant to the president; R W Foltz, assistant sales manager; A Bagian, sales engineer; and the following salesmen: A March, P Parrott, J Ballentine and S Huffstetler.

Stampagraph Co, Inc

Booth 78
79 Alexander Ave, Bronx, New York, N Y

On display: Kleenstick labels which require no water and may be put on or taken off without leaving a mark or stain; hot-iron color transfers for hosiery, underwear; decorative transfers for lingerie, tee shirts.

In attendance: George Chadwick, president; George K Chadwick, Edward A Reilly.

Steele Canvas Basket Co, Inc

Booth 502
199 Concord Turnpike, Cambridge, Mass

On display: Canvas bags, baskets, trucks and hampers.

In attendance: Albert E Pratley, president and treasurer; Gordan L Whynaught, sales manager.

Tubular Textile Machinery Corp

Booths 89 C & D
33-61 54th St, Woodside, N Y

On display: Finishing machinery for circular knit fabrics; exhibits covering the processing of circular knit goods from the dyehouse to the cutting room (featuring continuous wet spreading, extracting and chemical processing); drying; stripe matching; and calendaring. A highlight of the display will be the Tube-Tex All-Purpose Calendar, a recently developed unit combining the features of the tensionless and straight-line calendars. It is stated that this machine can be used for relaxation shrinkage control, stripe or course straightening, conventional type fabric steaming, or practically any steaming operation required for a circular knit piece of fabric.

In attendance: Eugene Cohn, Don Foreman, John Sasson, Lee Rothenberg and Mac Gold.

Turbo Machine Company

Booths 154-159
840 West Main Street, Lansdale, Pa

On display: AD-48 Machine for women's nylon stockings and the Turbo Finish Boarder F-48. Originally developed in 1950, the AD-48 is a dual purpose machine. It preboards with steam, finish boards with heated air, or combines the two. An improvement in the steaming chamber, which is 4" higher than previous models, permits the use of longer leg forms.

In attendance: H W Matthews, B C Hall, F Huguenin, P Wenhold, W K Wyatt, A S Karcewski and W N De Turk.

Underwear Institute

Booth 105A
2 Park Ave, New York, N Y

Reception booth.

Utica Novelty & Mill Specialty Co

Booths 79-82
2145 Dwyer Ave, Utica, N Y

On display: Utica combination cutting and winding machine, Utica collarette cutter with roll attachment, Utica hand laying up machine, Utica conveyor for air press for pressing knitted garments.

In attendance: J A Firsching, Jr, Donald Firsching, Joseph A Firsching, 3rd.

Veeder-Root, Inc

Booth 265
70 Sargeant St, Hartford, Conn

On display: Redesigned series of multiple shift counters allowing for three shift operation and an additional unit for the determination of roll lengths; counting devices for wage incentive plans, product on control and for uniformity and quality control.

In attendance: A E Kallinich, vice presi-

dent; G L Logan, sales manager; R E Walker, district engineer, Philadelphia; T Nelson, field sales manager; W T Heydt, New York district manager; R W Moller, district engineer, New York.

Venango Engineering Co, Inc

Booths 464-465
G and Lycoming Streets, Philadelphia 24, Pa

On display: Conventional and high-temperature dyeing machinery for packages, rawstock, tops, hosiery and sweaters.

In attendance: A Robertson, W Stegers, C H McCandless.

Walton Laboratories, Inc

Booths 456-458
1186 Grove Street, Irvington 11, N J

On display: A complete line of humidifying equipment for yarn storage as well as for manufacturing areas. Included will be industrial humidifiers, dehumidifiers, humidity controls and indicators, and other equipment for maintaining accurate humidity conditions. The new Aqua-Sorber Dehumidifiers for summer conditioning will be shown for the first time.

In attendance: John B Feldermann, advertising manager, and J R Lewis, industrial sales manager.

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THE PHYSICAL ACTION OF SURFACE-ACTIVE AGENTS IN THE MECHANISM OF DETERGENCY

HENRI L ROSANO and MARIANNE WEILL

(Translated from the French by P J Wood, Technical Director, Royce Chemical Company)

INTRODUCTION

IN the first part of this work, we have adapted the tensiometric technique of J and L P Guastalla to the interfacial wetting and "dewetting" (immersion and withdrawal of a solid plate through an oil-water interface and an oil-aqueous detergent solution interface). In the second part, we have visually observed the behavior of oil drops on a solid immersed in water and in an aqueous detergent solution.

The results obtained were as follows:

a) For aqueous solutions of detergents, the mechanical work seems to resolve itself into a matter of emulsification facilitated by the presence of the detergent (reduction of the interfacial tension of the oil-aqueous detergent solution as compared with that of oil-pure water). Nevertheless, the physical action of the detergent solution is limited and there remains a microscopic layer of residual dirt which can only be removed by the chemical action of mineral salts in the detergent mixture.

b) The ionic character of the detergent plays an important role in the redeposition of the emulsified dirt droplets.

DEFINITIONS

As far as this research is concerned, detergent action can be considered as the removal of dirt from the surface of a solid with the help of an aqueous solution. We are not considering here dry cleaning with volatile solvents, e g, benzine, tetrachloroethylene, etc, nor the method of cleaning by adsorption on a solid body, such as vegetable or animal charcoal. Some authors (*1, 2, 3*) define the physico-chemical process of detergency as the substitution of a solid-solution interface for a solid-oil interface. However, direct observations and practical experience lead us to think that this explanation is not always correct. As we shall show later, detergents have a limited action, leaving a residual oily film.

DISCUSSION

In the phenomenon of detergency we must take into account the nature of the dirt, the composition of the detergent solution and the nature and the geometric shape of the substrate.

NATURE OF THE DIRT——Most types of dirt contain fats (*4, 5*). Brown (*4*) gives the average composition of the fats found in domestic dirt, as follows:

	%
Free fatty acids (Average C_{28}, Iodine Value 46)	31.4
Fatty acid triglycerides (Average C_{58}, Iodine Value 46)	29.2
Saturated and unsaturated fatty alcohols, cholesterol (Mol Wt 275, Iodine Value 63)	15.3
Saturated and unsaturated hydrocarbons (Average C_{20}, Iodine Value 50)	21.0

Dirt also contains solid particles, such as soot, sand, dust and coloring matters. It is important to note that these solid particles are frequently covered with fatty soil. Dirt may also contain proteins. Thus, the most important problem of detergency seems to be the removal of fatty soil by means of an aqueous solution.

NATURE OF THE SUBSTRATE——It is well known that rayon and wool are more easily cleaned than cotton, when all three are soiled with the same type of dirt. The geometric form of the substrate must, therefore, be taken into account; a porous solid having a large adsorbent area will require a larger quantity of detergent than a nonporous solid having the same apparent surface.

NATURE OF THE DETERGENT——Surface-active agents have an amphipatic character; one part of the molecule is water soluble, the other, fat soluble. In the case of potassium laurate the radical —COOK is water soluble while the aliphatic chain, C_{12}, is fat soluble. Detergents are divided into two main groups, electrolytes and non-electrolytes. In these two groups are detergents which are anionic and others which are cationic in character. Some detergents are amphoteric; but depending on the conditions under which they are used, detergents will exhibit either anionic or cationic properties. Even detergents that are non-electrolytes, when in solution, may show an apparent ionic character. Anionic detergents form the most important group. In this classification are to be found ordinary soaps, alkyl sulfates, and alkyl-aryl sulfonates. Cationic soaps are less frequently used (*6*).

In order to study this problem on a physico-chemical basis, it is necessary to review the various factors which enter into the phenomenon of detergency. These are classified in order of importance, as follows:

I. *Fundamental factors.* Those which are to be found in all operations of detergency:

a) Wetting power
b) Variation of interfacial energy due to adsorption of the surface active agents.
c) Adhesion of the dirt to the solid substrate.
d) Interfacial electrical forces.

II. *Secondary factors.*

a) Emulsifying power.
b) Dispersing and defloculating power.
c) Protective action and redeposition.
d) Mechanical action.
e) Foaming power.
f) Resistance to calcium ions.
g) Temperature of the bath.
h) Taste and smell.

and, we may also add, detergency is a dynamic phenomenon.

At first sight, the study of the mechanism of detergency appears to be very complicated. In order to choose a suitable physico-chemical method, it is necessary to devise a technique that will make it possible to follow the evolution of the main factors. Supposing that the surface has been wetted and that the soil to be removed has a fatty character, the physico-chemical problem of the removal of the fatty soil resolves itself into a study of the replacement of a solid-oil interface by a solid-water interface.

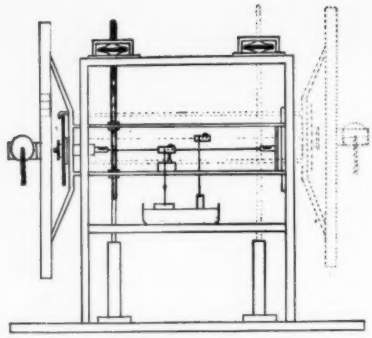

Figure 1

In order to do this, we used the tensiometric technique of J and L P Guastalla (7) to determine interfacial "wetting and dewetting" (immersion and withdrawal of a solid plate through an oil-water, or oil-aquaeous detergent solution interface).* Figure 1 shows a sketch of the apparatus used (8). Most of the measurements were made using a motor adapted to the tensiometer which gave a movement of the solid plate of 1/10 mm in 4 seconds, 15 seconds or 25 seconds in relation to the interface. Other experiments consisted in the observation of the behavior of oil droplets deposited on a solid plate immersed in water or in a detergent solution.

INTERFACIAL WETTING CYCLES ——According to the character of the solid surface used, three types of interfacial wetting are obtained:

a) *Hydrophilic solids* (*wet glass*): The plate remains coated with water when entering the oil phase; this measurement gives the interfacial tension and not the adhesion tension.

b) *Hydrophobic solids* (*paraffin***). The plate remains coated with oil.

This measurement also represents the interfacial tension.

c) *Solids with intermediate properties:* A cycle of interfacial wettability is obtained, the magnitude of which is always smaller than, or at most, practically equal to twice the value of the interfacial tension (γ_i).

Figures 2a and 2b represent the shape of the menisci and the experimental curves obtained in the three cases.

In the case of a plate coated with cellulose varnish and a Nujol-water interface, no matter what the speed of the operation, the interfacial wettability cycle is always smaller than $2\gamma_i$. With the same plate and a Nujol-detergent solution interface, the value of the interfacial tension is lowered

* The oil used was pure paraffin oil (Nujol).

** The experiments were made with sheets of tin foil coated with paraffin wax which were soaked in Nujol for several hours to solubilize the wax slightly on the surface.

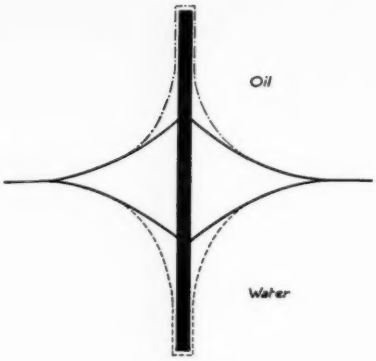

Figure 2a

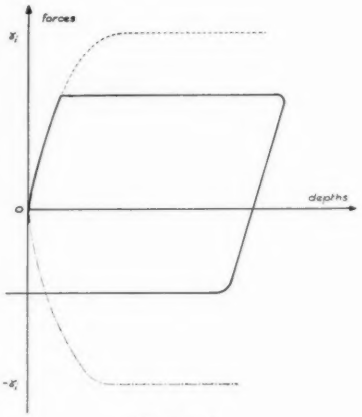

Figure 2b

HYSTERESIS OF INTERFACIAL WETTING——N K Adam (1), on examining under the microscope some wool fibers that had been coated with lanoline and plunged into a solution of sodium cetyl sulfate, noted the formation of globules on the fiber. In the presence of the detergent the dirt gathered together at one point on the fiber. According to Adam, the process of detergency seems to consist in reduction of the contact angle measured in the aqueous phase from 180° to 0° (2, 3). As Adam remarks, the contact angle is not and the magnitude of the hysteresis cycle is also lowered. If the movement of the plate in relation to the interface be brought down to an extremely low rate, the cycle can be still further reduced. But these conditions are far removed from those of practical detergency.

In the speed range varying from 4 to 25 seconds for a 1/10 mm movement of the plate, the interfacial wettability cycle has a value close to $2\gamma_i$, the plate emerging from the oil enters the aqueous detergent solution as if it were completely wetted by the oil, then going in the opposite direction it enters the oil as if it had become completely wetted by the aqueous solution. really zero, since the droplet remains attached to the solid by a peduncle (Fig 3).

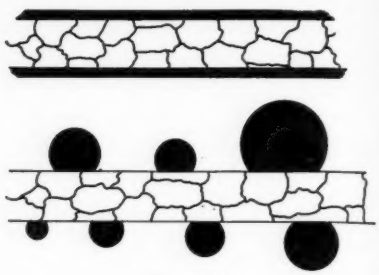

Figure 3

Elsewhere it has been shown (9) that the force opposing the displacement of a drop of liquid from a solid plate or of an air bubble under an immersed solid plate is equal to the product of the diameter of the contact area (drop-solid) multiplied by the hysteresis value of interfacial wetting $\Delta\zeta$. We have tried to apply these ideas to the case of a drop of oil attached to an immersed solid surface (taking into account the interfacial wetting hysteresis $\Delta\zeta_i$).

It had been noted previously that the stability of air bubbles adhering to solid paraffin wax was decreased in the presence of a wetting agent; we had hoped to show a similar phenomenon in the case of oil globules adhering to a solid surface.

a) Some drops of Nujol were deposited on a glass plate that had been previously rubbed with oleine. The plate was immersed in an optical cell containing either pure water or a detergent solution. (The angle of inclination of the plate in the cell can be adjusted at will.) The shape and size of the oil drops were observed by throwing the image of them onto a screen. Figs 4, 5 and 6 show the shape of the drops on the screen, but actually they should be shown upside down.

b) Interfacial wetting and dewetting cycles were measured with the tensiometer, using a glass plate rubbed with oleine and Nujol-water and Nujol-detergent solution as the interfaces.

RESULTS

In pure water, Nujol gathers together in droplets having the shape of spherical segments. As the plate is tilted the drop assumes a shape giving it an angle of contact at the rear of 180° while the angle at the fore is near 90°. An accumulation of liquid takes place in the forepart of the larger drop, which breaks up into two smaller drops.

When a detergent is added to the water as the plate is in a horizontal position, a reduction of the area of contact between the smaller drops and the solid may be observed. In the case of the largest drops there is a sinking of the drop due to the

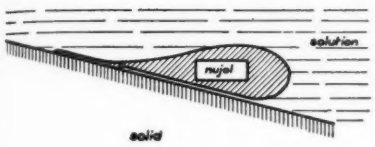

Figure 4

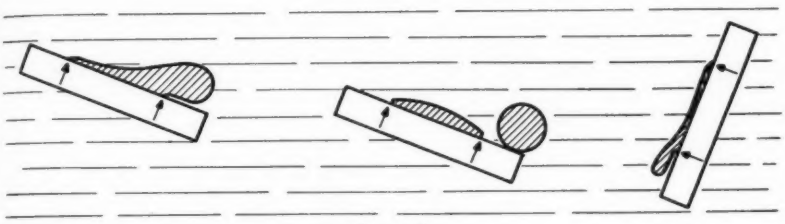

Figure 5

reduction in the interfacial tension, which has the effect of increasing the area of contact between the drop and the solid instead of decreasing it. This helps explain why the small drops detach themselves more easily from surfaces than the larger ones.

When a liquid drop moves on the surface of an immersed solid, it is interesting to investigate the influence of the ionic character of the detergent.

Anionic detergent (*sodium lauryl sulfonate*); the drop assumes an elongated shape (Fig 4). In front, the contact angle of the oil drop to the solid, measured in water, is zero and the drop floats over a film of the solution; at the back, the contact angle is 180°. Generally the oil accumulates in the fore part of the drop and, if the drop is large enough, will break off in the form of an emulsion as the plate is tilted. The remaining liquid oil, upon further inclination of the plate, will form another globule which, in turn, will also detach itself from the plate. Nevertheless, the anionic detergent leaves a film of soil (oil) on the plate which can easily be seen by bringing the plate back to the horizontal plane and then tilting it in the opposite direction (Fig 5).

Cationic detergent (*cetyl pyridinium chloride*): As the plate is tilted, there is what we have seen here is a redeposition of the emulsified dirt globules.

TENSIOMETRIC STUDY —— When a glass plate rubbed with oleine passes through a Nujol-water interface, the interfacial adhesion tension on immersion $_A\zeta_1$ has a value different from γ_1; but that of the interfacial adhesion tension on withdrawal $_R\zeta_1$ is, making due allowance for experimental error, equal to the value of interfacial tension measured after the passage of the plate. The glass plate leaves a film at the interface.

With a detergent solution, the magnitude of the interfacial cycle is practically the same value as $2\gamma_1$. Figure 7 illustrates the probable mechanism; the plate would remain covered with a film of Nujol, which itself would become wettable (by the water) and oleophobic (due to the adsorption of the detergent) so that when the plate passes back again into the oil its properties would be those of a hydrophobic solid.

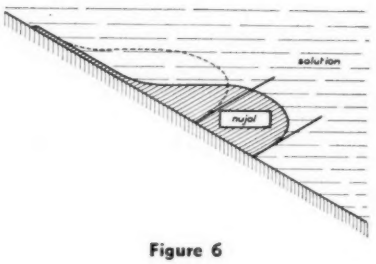

Figure 6

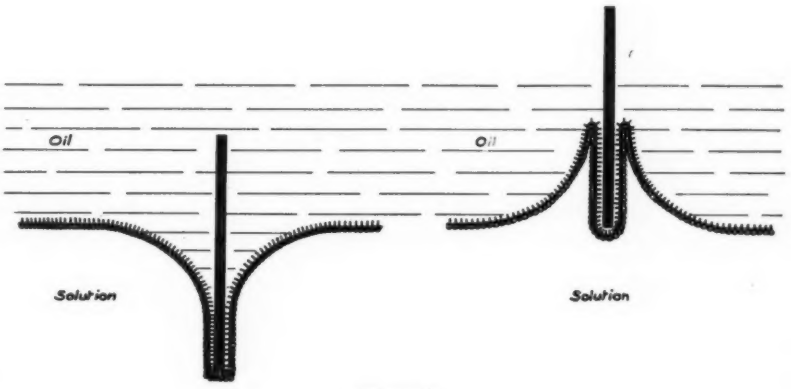

Figure 7

CONCLUSION

We have seen a substitution of interfaces in the case of Nujol-pure water with a glass plate and a cellulose-varnish coated plate, but we have never seen this phenomenon using a Nujol-detergent solution interface. With a Nujol-water interface the interfacial wetting hysteresis is high and the work of removal of the oil is considerable.

This study seems to indicate that with detergent solutions, the mechanical work of detergency reduces itself to a matter of emulsification facilitated by adsorption of the detergent (lowering of the interfacial tension). There is a limit to the physical action of the detergent, and a more-or-less strongly adhering film of soil, varying with the nature of the substrate, is left on the surface. This film can only be removed by chemical action of the detergent itself or of the mineral salts added to the detergent compound.* Moreover, the direct observations show the importance of the electrical charge of the lipophil ion in the phenomenon of soil redeposition.

From this it is easy to understand why pure sodium lauryl sulfonate is not as good a detergent as the same compound with added mineral salts. In addition to the advantages accruing to the use of these salts (increase in the speed of adsorption of the detergent and dispersion of calcium ions), they complete the actual detergent operation by chemically attacking the thin residual film of soil.

* Although we say "chemical action" of the detergent, as opposed to "physical action," we are merely being conventional. We agree, for instance, that the increase of the negative charge due to the addition of a basic salt provoking a variation of the zeta potential, is a physical action.

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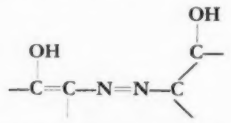
• PATENT DIGEST •

PAUL WENGRAF

DYEING WOOL—— Combinations of Dyes, Dyeing Under Acid and Neutral Conditions C, 4, 06

U S Pat 2,610,103
(Ciba Ltd——Widmer et al——Sept 9, 1952)

Although a certain group of o-o-dihydroxy monoazo dyestuffs is known to be relatively soluble in neutral to alkaline media, it is pointed out in the preamble to this patent that these compounds are not sufficiently soluble in acid dyebaths. They are characterized chiefly by a lack of solubilizing, free-sulfonic groups, but may contain other substituents, such as sulfonic acid amide groups. (USP 2,610,103 gives many examples of their constitution, while German Pat 445,888 covers a "typical" member of this group.) They possess otherwise valuable properties, giving very fast dyeings in the single-bath chroming process. Obviously it would be desirable to apply them in the customary afterchroming process from an acid bath, but in this event the dyes are precipitated by the acid in coarse form, giving non-uniform dyeings of poor crocking fastness. In general, these dyes containing the group



are soluble in the form of their alkali salts, wherein one of the hydroxy groups alone is substituted by alkali.

It has been observed that dyestuffs of the type mentioned above can also be dyed from an acid bath when combined with o-o-dihydroxy monoazo acid dyes, suitable per se for dyeing from an acid bath. A great number of dyes of the latter group is available, bearing sulfonic, carboxylic or other solubilizing groups (e g, dinitro phenol radicle. Among the many examples are Acid Alizarine Black R (C I 172), Chrome Fast Black PV (C I 202), and Nerol 2B (C I 652).

The two dyestuff classes that have to be combined in the dyebath are briefly characterized in the claim as follows: the first mentioned group is soluble in dyebaths of a pH between 6.3 and 8.0, the second, in dyebaths of a pH below 6.3.

Examples refer to deep black, brown, violet brown, blue, bordeaux, etc, shades dyed from an acid bath—first acetic, then sulfuric acid——and after-chromed.

References cited by the Patent Office:

U S Pat 2,060,186 (Ciba /1936): mixtures of acetate dyes of the anthraquinoid group having similar constitutions (homologs, analogs, isomers) are found to dye acetate rayon in deep shades while the corresponding single components give weak shades only.

U S Pat 2,058,433 (Ciba /1936), copending with the above patent, refers to an analogous process with mixtures of azodyes for acetate rayon.

Ger Pat 445,888 (Ciba, July 7, 1925) covers the preparation of azo dyes and chromium compounds derived from these substances and characterized by the coupling of *nonsulfonated* aromatic oxydiazo compounds with nonsulfonated aryl pyrazolone derivatives, one of the components containing a sulfonamido group. According to Friedlander's *Patent Abstracts*, this patent is parallel to U S Pat 1,623,005. The azo dyes mentioned in the examples contain sulfonamido groups but no solubilizing acid groups; they are soluble in dilute alkalis. No *Colour Index* number could be found for this special dyestuff class.

FINISHING TEXTILES—— Nylon Substance Precipitated on Textiles G, 2, 01

U S Pat 2,610,927
(Tootal-Broadhurst-Lee Co——Foulds——Sept 16, 1952)

The first patents on nylon, e g, Carothers' U S Pats 2,071,250, 2,071,253 and 2,130,948, disclosed the method of producing linear superpolymers and their properties. U S Pat 2,071,253 mentions solubilities in formamide, phenol, concentrated HCl, H_2SO_4 and glacial acetic acid (p 6, left hand col, 10-25). U S Pat 2,130,948 protects a spinning method using these nylon solutions to produce filaments, foils, films and the like, but coatings are not described to any degree.

The current invention advocates the application of solutions of the linear superpolyamides as finishes on textile fabrics, such as cotton, linen, wool, natural silk, viscose, acetate rayon, etc. Finishes hitherto applied by coating with organic solutions of nylon substance (cf reference to U S Pat 2,359,878 below) are said to substantially change the characteristic feel of the material. In contrast, the method described in the present patent is said to produce water-insoluble deposits that do not change the typical character of the finished textiles. Simultaneous imparting of dull effects or combining this finish with creaseproofing, "Zelane"-waterproofing or parchmentizing treatments are within the scope of this invention.

This object is reportedly attained by impregnating with nylon substance dissolved in strong acids and precipitating the polyamides by hydrolyzing in a second step on the fiber's surface. It was surprising to find that the hydrolysis takes place so slowly that solutions can be applied without premature decomposition. The concentration of the acid (in the examples—— sulfuric of 70° Tw, nitric of 78° Tw, commerial hydrochloric or concentrated formic) has to be strong enough to dissolve the polyamide but should be adjusted on the other hand to prevent hydrolysis before use. The use of sulfuric acid is preferred.

Example: 2 p polyhexamethylene adipamide (m p 278° C) are dissolved in 27 p b w sulfuric acid of 70° Tw. Cotton or viscose fabrics are padded with this solution, squeezed, washed with water and neutralized.

Resists consisting of acid-resistant pastes, such as nitrocellulose compositions, may be preprinted before the aforementioned treatment is applied.

References cited by the Patent Office:

U S Pat 2,359,878 (Du Pont /1944): dissolving nylon substance in alcoholic calcium chloride solutions for coating textiles. The solvent is thereupon evaporated or the nylon substance precipitated by a nonsolvent, e g, low alcohols or water.

U S Pat 2,342,387 (Du Pont /1944): nylon-type polyamides are applied as coating substances by using fine dispersions, obtained by dissolving the polyamide in concentrated hydrochloric or formic acids, and pouring into a nonsolvent, such as lower alcohols, ethylacetate or acetone, while the solution is vigorously agitated.

U S Pat 2,302,332 (Du Pont /1942): finely divided polyamides are mixed with a liquid, which acts as a nonsolvent at room temperature but as a solvent at elevated temperatures, e g, benzyl alcohol or furfuryl alcohol. After coating is performed with this dispersion, the substratum is heated and the liquid removed by evaporation.

U S Pat 2,188,332 (Du Pont /1940): coating cloth or paper by using solutions of nylon in formic acid or by applying a preformed film of the same substance and pressing it to the cloth or paper at elevated temperatures.

U S Pat 1,640,596 (Celanese /1927): coating materials with a cellulose ether or ester solution and thereafter precipitating this solution (preferably) with water.

WATER REPELLENT FINISHES——Organosilicon Compounds Combined with Amino Resins G, 2, 02

U S Pat 2,612,482
(General Electric Co——Rasmussen——Sept 30, 1952)

Water-repellent finishes based on organopolysiloxanes are well known. They have been particularly described in U S Pat 2,386,259 /1945 (see references). An earlier patent (U S Pat 2,306,222——Gen Electric Co) had generally disclosed the water repellent effect obtained with a treatment with organo-halogen silanes. Amino resins also have been used quite frequently as creaseproofing agents, improving to some extent the hydrophobic properties. According to this latest specification, a combination of the three gave surprising results, superior to the effects of any of the single components

The components are:

a) *Organopolysiloxanes.* These have only hydrocarbon radicals, usually methyl groups attached to the Si- atoms, as described in U S Pats 2,469,888 and 2,469,890. They are higher polysiloxanes, useful as lubricants and prepared from methyl trichloro- and trimethyl monochloro silane. Upon hydrolysis, they give a methyl-tri (trimethyl siloxy) silane . . $(CH_3)_2SiR$ . . wherein "R" is the radicle —O—$Si(CH_3)_3$.

b) *Hydrolyzate of methyl dihalogenosilanes,* e g, methyl dichlorosilane (see reference to U S Pat 2,386,259 below). This component contains, besides the alkyl group, a reactive H- atom linked to the Si. This compound is present in the total organosilicon mixture at a ratio of 5-25%, while component (a), i e, organopolysiloxanes, contain no free H.

c) *Amino resins,* employed in this composition, may be of the urea- or melamine aldehyde precondensate type.

These three ingredients are used preferably in the form of an emulsion. A suitable emulsifying agent, for example, is stearamine acetate or "Tetrosan," an alkyl dimethyl dichlorobenzyl ammonium chloride wherein the alkyl chain contains 8-18 C- atoms.

A general procedure consists of mixing the urea- or melamine resins (c) with a concentrated emulsion of (a) and adding (b) while agitating until a homogenous emulsion results that can be diluted to the necessary concentration, e g, 2%. The procedure further requires drying and curing operations at the same time for 2 minutes at 150° C or for one minute at 400° C. A table comparing the effects of treatment with silicon- and amino-resins shows spray-rating test performances of "superior" after three launderings or after one dry cleaning as compared to results obtained when the amino resin component is omitted.

References cited by the Patent Office:

U S Pat 2,511,296 (Montclair Research ——Ellis Foster /1950): copolymerization of silicohaloform derivatives (silicochloroform) with another organosilicon compounds, such as methyl silicon trichloride, for laminating and insulating purposes.

U S Pat 2,500,842-43 (Montclair Research——Ellis Foster /1950): obtaining lacquers and molding compositions from organosilicon derivatives compounded with triazine- or urea resins.

U S Pat 2,386,259 (General Electric Co /1945): waterproofing with organic solutions of oily hydrolysates of methyl dihalogeno silane (CH_3Cl_2Si H), obtained by dissolving in ether, washing to remove free HCl, and redissolving the acid-free product in toluene or the like.

U S Pat 2,191,362 (Ciba /1940): using melamine resins as finishing agents in general. This patent also mentions combinations with paraffin emulsions, waxes or other resinous products but avoids mention of silico-organic compounds.

Reference may be made to U S Pat 2,306,222 (Patnode to General Electric Co) mentioned in the current specification: organosilicon halides, such as a mixture of monomethyl trichloro- and dimethyl dichloro silanes, are used in vapor form, probably giving mixtures of silicones or silicols. The nomenclature of organo-silicon products has been discussed in Patnode's U S Pats 2,469,888 and 2,469,890; these specifications are very useful for explanation of the terminology of organosilicones in general.

DYEING CELLULOSE ACETATE with Indigosols——Urea Added C, 4, 07

U S Pat 2,614,023
(Celanese Corp of Am——Olpin, Jackson——Oct 14, 1952)

This patent is parallel to Brit P 641,835 [cf *Am Dyestuff Reptr 40,* 68 (1951)].

Among other references to this patent cited by the Patent Office:

U S Pat 2,428,835/36 (Celanese /1947): printing or dyeing of acetate of cellulose with water soluble dyestuffs from a dilute alcoholic solution plus a swelling agent, such as ammonium thiocyanate [cf *Am Dyestuff Reptr* 37, 397 (1948)].

U S Pat 2,080,254 (Celanese /1937): dyeing acetate rayon with dyes having poor affinity for it by applying the dyestuff in suspension and heating to about 160° C to effect penetration.

U S Pat 1,816,766 (Durand & Huguenin /1931): dyeing cellulose acetate by impregnating with indigosols, drying and steaming.

Brit P 599,055 (Celanese /1948): dyeing cellulose acetate by mechanical impregnation with an alcoholic solution (up to C_6) of the dye plus a swelling agent, such as ammonium thiocyanate, and steaming.

ABSTRACTS

Definition of the Term "Washable"

A Greyborn, *Canadian Textile* J69, 69, December 19, 1952.

According to Webster's Dictionary the definition of the term washable is "that may be washed, especially without damage." It does not give any details of what procedure should be used or any other particular information. It does not mention the major factors of time, temperature, and detergent.

A person having a soiled garment marked "washable" is not going to study a dictionary before washing. But even if they did, the information obtained would be of no use in the process of washing the garment.

If a housewife were to reason this way: "I will give the garment the same treatment as I do my nylon stockings," she would obtain satisfactory results. But were she also to reason that, since her husband's shirts are also washable, she can wash the garment together with the shirts——the results would be disastrous. As far as the label "washable" is concerned, neither washing is wrong. If the garment labeled "washable" was sent to the laundry, they would not know any more about how to classify it than the housewife. Being technical people with considerable experience they would probably give the garment a mild wash.

In short the label "washable" does not give any information on how to wash the garment. With a "washable" label on a garment it would not be unreasonable for a woman to put it in a washing machine, fill it with hot water at 160° F, and wash it.

By comparison, other terms such as "hand washable" give us an indication as to how the garment should be washed. We would know that the temperature would not be above 110° F because it would be too hot on the hands. The time would be limited because nobody would keep their hands in warm water and soap very long.—WHC

A Survey of the Quality of Crease-resist Treatment on Fabrics Supplied to the Retail Trade

H W Best-Gordon, *J Soc Dyers Colourists* 69, 41-50, February, 1953.

The application of resin finishes to textile fabrics raises many interesting problems, and it was felt that a survey of the actual quality of finished fabrics supplied to the retail trade would provide interesting data. A detailed investigation was carried out on rayon fabrics crease-resisted with urea-formaldehyde resins. The results are summarized, and observations of interest to the technician are made on the possible causes of some of the more outstanding faults.

The most important factor, from a consumer's standpoint, is the ability of the fabric to recover from creasing; next comes the effect of washing (with regard to retention of color, overall fabric dimensions, and crease-resistant properties), followed by fastness to light, and the degree of freedom from chemicals that have been used in the process.

Those fabrics with a crease recovery of the order of 90.0 per cent, which were wash-fast, dimensionally stable, dyed with dyes of good light fastness, and with a relatively low free formaldehyde figure, were considered to be satisfactory. Failure in any one item of the foregoing was regarded as an undesirable feature.

With this in mind, 260 fabrics——plain-dyed, woven stripes, and printed——made from rayon or mixtures thereof, were tested. The samples were obtained, over a period of about four years, from various sources, such as dyers' merchants, converters, makers-up, wholesale houses, and retail shops. A number of samples were also obtained from similar sources in America, France, Italy, and Sweden. The type of fabrics selected were those intended for use as wearing apparel.

The fabrics collected were examined under eight main headings:

1) Assessment of crease-recovery properties by measurement of creasing angles, using three different methods.
2) Effect of added resin on crease recovery, amounts of formaldehyde and nitrogen in the added resin, and reaction of formaldehyde with the cellulose.
3) Free formaldehyde as evidence of effective washing after the treatment.
4) Degree of fiber swelling in cuprammonium solution.
5) Efficiency of processing as shown by resin distribution.
6) Fastness to washing (i e, launderability).
7) Fastness to light.
8) Resistance to abrasion.

The results obtained during the survey, according to the author, have shown that the crease-resisted fabrics supplied to the retail trade vary widely in their performance. Generally speaking, however, it was clear that excellent results could and were being obtained; but many processing defects were revealed, which could have been prevented.

Chemical analysis of the fabrics has led to the conclusion that the variations are largely due to lack of adequate technical control, not so much, however, in the actual preparation of the resin as in its general application to the fabric.

The actual amount of resin added to the fabric does not appear to bear any relationship to the crease-recovery behavior of a particular fabric, for some having a low resistance to creasing had a reasonable amount of resin, while others with either high or low resin figures had produced a high degree of crease recovery.

There are 21 references to the literature, only two being of American origin.—WHC

Naphthol Dyeings: Factors which Influence Fastness to Rubbing

A J Hall, *Textile Mercury & Argus* 128, 252-6, February 6, 1953.

Naphthol dyes, sometimes termed the insoluble azoic dyes, are of considerable importance to dyers of cotton and cellulose rayon materials because of their ability to give colorings with a general fastness comparable to that of the vat dyes.

However, these dyes suffer from one defect——their liability to give shades susceptible to rubbing. When a naphthol solution is applied to the fabric by padding, which is followed by mangling, most of the liquor is left inside the fibers, but a small amount will adhere to the outside of each fiber. On coupling with the diazo solution, surface dye is formed on the outside of the fibers as well as on the inside. The susceptibilty to rubbing of the dyeing will depend on how much dye is formed on the outside.

In the past a considerable amount of research has been directed toward discovering the best conditions of dyeing and the most efficient methods of after-scouring to prevent rubbing. A recent paper by W Wuterich (*Textilber* 33, 743 (1952), which covers the same ground from the viewpoint of German dyers, notes many interesting and practical features of naphthol dyeing, avoiding the production of shades which are liable to rub.

The author points out that the different Naphthols used to produce insoluble azoic dyes vary in their substantivity; also, that the substantivity can be considerably increased in some cases by the addition of an electrolyte to the naphthol bath. By using Naphthols of high substantivity and also adding an electrolyte, one may increase the amount of naphthol absorbed on the inside of the fibers and lessen the amount of naphthol left on the surface, with a consequent decrease in the tendency to rub off.

An alternative method for reducing the amount of loosely adhering naphthol on the cotton material before development is by washing the naphtholated material with a slightly alkaline salt liquor.

Since the naphthol preparation is carried out with an alkaline liquor, there is opportunity for the material to absorb some of this alkali, and when it enters the coupling bath, a partial decomposition of the diazo component may take place, with resultant rubbing defects. An alkali-binding material should therefore be added to the coupling bath, and the pH should be kept between the limits of 3 to 7.

The addition of a nonionic substance, such as Diazopon A, is also recommended, to ensure that any dye formed on the surface is in a finely divided condition so that it can be easily washed out.

The author also stresses the importance of a vigorous hot soaping after dyeing, using soft water.—WHC

Looking to the Future

M R Cross, *Textile Age* 17, 26, March, 1953.

At the present time, cotton of average length going into wearable fabrics, and adjusted for waste content, does not cost over 38c a pound. Rayon and acetate run from 37c to 39c a pound; wool runs about $1.75 a pound on a scoured basis; nylon, Orlon, Dacron, and Acrilan average about $1.80 a pound. Dynel and Vicara average about $1.15 a pound. These are all prices for the staple; most of the silk used is filament, so we will disregard this as staple. Filament prices run from 73c to 78c for rayon and acetate yarn; other man-made synthetics that are available run from roughly $1.90 up to over $7.00 a pound. Silk, at the present time, is about $5.40 a pound.

This is what we have to work with. Bear in mind that about 94 per cent of all of this possible production is with either cotton, acetate, or rayon——all at considerably lower prices than all the others. Based on these prices, the bulk of all of the woven goods is in price ranges to produce garments in price ranges to which the consumer is accustomed. One guesses that they are not going to change these ideas quickly. It is going to be a slow process and will only continue where the added price brings added qualities.

Generally speaking, the consumer will buy one or two of anything that is new in order to try it, but continuing business will be based only on merit and value. —WHC

Proceedings of the
American Association of Textile Chemists and Colorists

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Editor of Proceedings: **Carl Z Draves, 30 Lahey St, New Hyde Park, N Y**

APRIL 13, 1953

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EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

53-6

Education: high school and 9 years of evening textile school.

Experience: dyer and finisher, wool and cotton, with executive experience and other plant contacts.

Age: 47; single; references; Mid-west or South preferred, but not essential.

4-13, 4-27

53-7

Education: B S in Chemistry.

Experience: chief chemist of large textile mill now liquidated, and sales.

Age: 49; single; references; New England preferred, but not essential.

4-13, 4-27

53-8

Education: BTC, Lowell Textile Institute.

Experience: textile chemist, research and executive.

Age: 40; single; references; Eastern Massachusetts preferred.

4-13, 4-27

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Philadelphia Section to Visit American Viscose

Prior to their next regular meeting, which will be at the Hotel Du Pont, Wilmington, Del, on April 17, the Philadelphia Section will visit the Textile Research Department of American Viscose Corporation, Marcus Hook, Pa, where guided tours through the various divisions will be conducted in the afternoon.

Following the tours, there will be an address of welcome by H Dalton, vice-president in charge of sales for Avisco, and a talk by Rene Bouvet, head of the Textile Development Branch, on "What the Textile Research Department Means to the Textile Trade".

The evening program in Wilmington calls for a welcome by National Publicity Chairman George H Schuler, E I du Pont de Nemours & Co, Inc. Speaker of the evening will be Paul L Meunier, manager of sales development of dyes for hydrophobic fibers, Dyes and Chemical Division, E I du Pont de Nemours & Co, Inc, who has chosen for his subject "New Developments in the Dyeing of Orlon Acrylic Fiber".

CALENDAR

AATCC

COUNCIL
April 17, June 5.

NATIONAL CONVENTIONS
September 17-19, 1953 (Hotel Conrad Hilton, Chicago); Sept 15-18, 1954 (Atlanta Biltmore, Atlanta, Ga); Sept 21-23, 1955 (Chalfonte-Haddon Hall, Atlantic City, N J).

HUDSON-MOHAWK SECTION
May 8 (Albany); June 19 (Outing).

MID-WEST SECTION
April 18 (Netherland Plaza, Cincinnati, O); June 13 (Outing, Lake Delavan, Wis); November 7 (Hotel Bismarck).

NEW YORK SECTION
April 17 (Fairleigh Dickinson College, Rutherford, N J); May 22 (Kohler's Swiss Chalet, Rochelle Park, N J); June 19 (Outing, North Jersey CC, Wayne, N J); Sept 25, Oct 3, Nov 20 (Swiss Chalet); Jan 29, Feb 26 (Hotel Statler, N Y); April 23, 1954, May 21, 1954 (Swiss Chalet).

NORTHERN NEW ENGLAND SECTION
April 17 (Lowell Textile Institute, Lowell); May 15 (Andover CC, Andover); June 12 (Annual Outing); Nov 6 (LTI); Dec 4 (MIT Faculty House).

PHILADELPHIA SECTION
April 17 (Hotel DuPont, Wilmington); May 22 (Outing Manufacturer's Golf & Country Club); Sept 11; Oct 23; Dec 4; Jan 15, 1954.

PACIFIC SOUTHWEST SECTION
April 24 (Nikabob Cafe, Los Angeles).

PIEDMONT SECTION
June 12-13 (Mayview Manor, Blowing Rock, N C); Sept 12 (Hotel Charlotte, Charlotte, N C).

RHODE ISLAND SECTION
Apr 24 (Wannamoisett C C); May 22 (Prov Eng Soc); June 12 (Outing, Wannamoisett C C); Oct 23 (Prov Eng Soc); Dec 4 (Annual Meeting, Sheraton-Biltmore, Providence).

SOUTHEASTERN SECTION
April 18 (Biltmore Hotel, Atlanta, Ga); June 19-20 (Outing, Radium Springs).

SOUTH CENTRAL SECTION
May 23 (Patten Hotel, Chattanooga, Tenn); Aug 21-22 (Outing, Chattanooga Golf & Country Club, Chattanooga, Tenn); Dec 5 (Patten Hotel).

WESTERN NEW ENGLAND SECTION
May 8 (Ladies Night); June 19 (Outing); Oct 2, Nov 6 and Dec 11 (Rapp's).

In response to many requests AATCC has made reprints of Part III of the *1952 Technical Manual and Year Book*, which contains the official Association test methods. The reprints are suitably bound for use in the laboratory. Copies are available from the Secretary, H C Chapin, Lowell Textile Institute, Lowell, Massachusetts, at a cost of $1.00.

COMING EVENTS

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
6th Northern Textile Conference, May 1 (Sheraton-Plaza, Boston, Mass).

AMERICAN OIL CHEMISTS' SOCIETY
44th Annual Meeting, May 4-6, Roosevelt Hotel, New Orleans, La; 27th Fall Meeting, November 2-4, Sherman Hotel, Chicago, Ill.

AMERICAN SOCIETY FOR QUALITY CONTROL
Textile Division: May 27-29, Convention Hall, Philadelphia, Pa.

AMERICAN SOCIETY FOR TESTING MATERIALS
1953 Annual Meeting, June 29-July 3, Chalfonte-Haddon Hall, Atlantic City, N J; 1953 Fall Meeting, Oct 14-16, New York, N Y.

AMERICAN TEXTILE MACHINERY ASSOCIATION
Exhibit of American Textile Machinery, April 26-May 1, 1954, Atlantic City Exhibition Hall, Atlantic City, N J.

ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, INC
April 21 (Hotel Belmont Plaza, New York, N Y—Symposium and Dinner); Annual Meeting—25th Anniversary-October 27 (Hotel Belmont Plaza, New York).

CANADIAN ASSOCIATION OF TEXTILE COLOURISTS AND CHEMISTS (Quebec Section)
April 17-18 (Annual Meeting, Mount Royal Hotel, Montreal, Que); June 20 (Annual Golf Tournament).

GARMENT DYERS GUILD OF AMERICA
1953 Technical Clinic, November, Seneca Plant, Rochester, N Y.

GORDON RESEARCH CONFERENCES
June 16-Sept 4 (Colby Jr College, New London, N H).

INTERNATIONAL FEDERATION OF TEXTILE CHEMISTS AND COLORISTS ASSOCIATIONS
1953 Congress: September 17-19, Luzern, Switzerland (under the auspices of the Swiss Association of Chemists-Colorists).

LOWELL TEXTILE INSTITUTE ALUMNI ASSOCIATION
All-Alumni Reunion, May 22 (Boston) and May 23 (Lowell).

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS
41st Knitting Arts Exhibition, April 27-May 1, Atlantic City Auditorium, Atlantic City, N J.

NEW BEDFORD TEXTILE INSTITUTE ALUMNI ASSOCIATION
Annual Homecoming & Clambake, June 6, New Bedford, Mass.

NEW YORK BOARD OF TRADE (DCAT)
Drug, Chemical and Allied Trades Section; 63rd Annual Meeting, Sept 24-27, Pocono Manor Inn, Pocono Manor, Pa.

PHI PSI FRATERNITY
50th Convention, May 7-9, Penn-Sheraton Hotel, Philadelphia, Pa.

PENNSYLVANIA STATE COLLEGE, SCHOOL OF HOME ECONOMICS
Annual Spring Weekend, April 17-18, State College, Pa.

PURDUE INDUSTRIAL WASTE CONFERENCE
8th Conference, May 4-6, Purdue University Memorial Union Building, Lafayette, Ind.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
June 11-13 (Joint Outing with Manufacturing Chemists' Association at The Greenbrier, White Sulfur Springs, W Va.

TEXTILE RESEARCH INSTITUTE
1953 Annual Meeting, Nov 12-13.

TEXTILE WORKSHOP
3rd Annual Meeting: June 10-July 1, Lowell, Mass.

Philadelphia Section Meeting Report

March 6, 1953
Kugler's Restaurant, Philadelphia, Pa

APPROXIMATELY 178 members and guests attended the March 6th meeting of the Philadelphia Section at Kugler's Restaurant, Philadelphia, Pa.

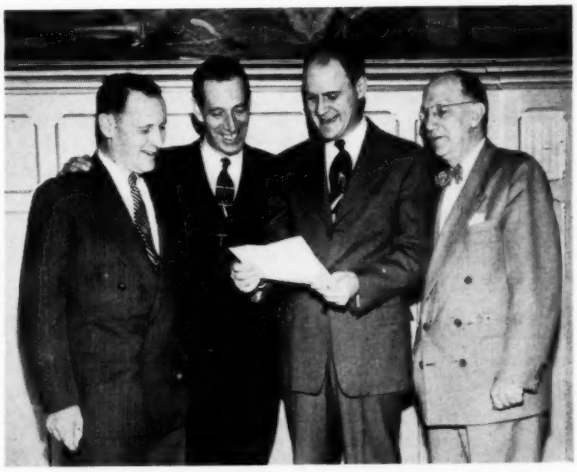
Chairman H L Morgan, James Lees & Sons Company, introduced the following guests: Nils Landquist, Rydboholms Textile Mills, Rydboholms, Sweden; William Mooney, Executive Secretary of the Pennsylvania Dry Cleaners Association; John Davids, late of London, England, now associated with Quaker Chemical Company, and Richard Cox of the Philadelphia Textile Institute.

Program Chairman J A Woodruff, American Viscose Corporation, introduced Bertil A Ryberg, Textile Research Department of the Procter and Gamble Co, who presented the P and G color film, "Leave Less to Luck".

A question and answer period followed, presided over by Mr Ryberg.

Respectfully submitted,
THOMAS J SCANLON, *Secretary*

Bertil A Ryberg, Procter and Gamble Company, discusses a point with Program Chairman Jackson A Woodruff, American Viscose Corp (left) and Chairman Harry L Morgan, James Lees and Sons Company.



Philadelphia Sectional committee chairmen discuss activities at the March meeting: (L to r): Ernest Burrell, Roxborough Co; Richard I Shimp, Du Pont; Henry J Rotters, Artloom Carpet Co; and Percival Theel, Philadelphia Textile Institute.

1953 NATIONAL CONVENTION

CHICAGO, ILLINOIS • SEPTEMBER 17, 18, 19

Headquarters: Conrad Hilton Hotel

Auspices of Mid-West Section

Convention Theme:

"American Achievement Today Challenges Comparison"

New York Section

A RAPID METHOD OF IDENTIFICATION OF TEXTILE FIBERS IN BLENDS*

DANIEL SASSI

Research Laboratories, Interchemical Corporation

Daniel Sassi

A rapid method for identifying all textile fibers is presented, for which the only special equipment required is a pocket lens or low-power microscope, besides the usual glass receptacles, sources of heat and chemicals to be found in all laboratories. The method makes use of stains, visual examination at a magnification of 30 (or 200) diameters, and chemical, solvent and flame tests.

INTRODUCTION

THE literature available to the textile technologist is well stocked with a large variety of assorted test methods and techniques by which to identify each of the well-known fibers. In addition, there are standard methods by which yarns or fabrics can be analyzed for exact percentage of each fiber present with well-established degrees of precision. In recent months renewed interest in fiber blends has evoked new identification tests and some extensions of older ones.

Unavoidably, a certain amount of confusion and overlapping of test methods has always been present. This situation, with regard to the standard well-known fibers, is certainly not improved, to put it mildly, by the advent of the half-dozen or so new postwar fibers, and by the impending arrival of four or five newcomers, which are known to be in their early development stages in the laboratories of several countries.

Much needed at this stage of the development of technical know-how on textile fibers is the establishment of a little order in this maze of assorted test methods, so far as ordinary everyday identification of fibers in blends is concerned. Where a precise analysis of a blend is required, giving good quantitative percentage of ingredients, it is obvious that a preliminary identification should be made first, on the basis of which the proper analytical methods can be selected. There are countless occasions, however, where only an estimate of fiber content is required, and where only a few minutes can be spared for such results to be obtained. For example, a dyer or a finisher may want to know just where, in the grey goods submitted to him, the various ingredients of the blend are placed, and, to a reasonable degree, how much of each component is involved. It may be of importance to know whether the yarns are completely blended, or twisted in such manner as to bring certain components of the blend effectively to the surface of the fabric or yarn, or whether the cloth under consideration is constructed of dissimilar warp and filling.

*Presented before the New York Section at Rochelle Park, N J on April 18, 1952.

TEST METHOD

THE THREE-STEP SCHEME OF IDENTIFICATION OUTLINED —— One answer to this need for a rapid, yet reasonably accurate, qualitative method is to suggest a combined but highly flexible schematization of three main methods of approach, namely:

1) Selective staining of the fibers present in an unknown yarn or fabric with a special dyestuff mixture.

2) Close visual inspection of the dye-stained yarns opened up manually under good magnification in the approximate range of 20 to 30 diameters, such as can readily be obtained with inexpensive lenses of the variety used in pocket microscopes. (It would, of ccurse, be *preferable* to use a microscope, where one can switch from 30 diameters to something of the order of 200, but this is not absolutely necessary.)

3) Chemical tests, solvent tests, or secondary coloring tests, where necessary, either on the yarns which have already been dye-stained or on fresh portions of the unknown samples. Whenever possible, solvent tests are carried out under the lens where the behavior of individual fibers in the yarn can be observed. Included in this third section of the identification scheme would be an occasional burning test, to serve only as a rough check.

The method of identification suggested here, based on the three steps just outlined, can usually be handled by the man in the mill in five or ten minutes with a bare minimum of laboratory tools and reagents. While a microscope greatly facilitates the work and usually supplies a direct and unambiguous answer early in the second step of the three-step scheme, its use is not essential. Practically all fibers can be identified with reasonable certainty by means of a few chemical tests in conjunction with dye-staining and close inspection under low-power magnification. The microscope is a definite time-saver, and of course it increases the percentage of accuracy of the method.

The suggested scheme gains considerable flexibility by having the dye-staining technique first. Thereupon one proceeds with only such tests as are indicated from the visual inspection of the particular sample in question. It saves considerable time to select only *necessary* tests to apply in each case, rather than to follow stepwise a completely comprehensive "qualitative" scheme of analysis.

THE FIRST STEP IN THE IDENTIFICATION SCHEME——As indicated previously, the first step in identifying the unknown textile sample is to apply a dye-staining test to it. This dyeing is only a first step and does not need to be relied

upon to give a final answer. It is used as a guide for further tests and as a visual aid in much the same way that a biologist uses stains to color, selectively, different bugs so that he can better see their outline under the microscope and properly identify them.

Dozens of dyestuff mixtures for textile-fiber staining have been concocted and used over the last twenty years or more. Many are readily available, either under proprietary names or as mixtures available for the asking from various dyestuff manufacturers. Some of these mixtures are excellent. Some of the earlier ones are inadequate for today's variety of fibers, but new mixtures are being offered in an attempt to keep abreast of the new synthetic fibers. Many analysts, however, find that they work most effectively with a pet dye mixture of their own invention, and the author is no exception. The mixture of dyes suggested in the present method stems from the concept that three dyes having widely different shade or hue and possessing totally different fiber affinities can provide a very convenient classification or rough breakdown of the fibers present in an unknown sample into several basic groups. Accordingly, the author has chosen dyes having desirable fiber affinities and capable of producing on the different fibers one or another of the three primary colors, red, yellow, and blue.

PROCEDURE——The first step, which is the dye-staining of the unknown sample, is carried out by boiling a piece of the unknown fabric or yarn, without any pretreatment, in a strong solution of the following dye mixture:

PRIMARY DYE-STAIN MIXTURE

1 part acetate yellow dye: Prototype 242, listed in the *AATCC Technical Manual and Year Book* under the foreign prototype name "Celliton Fast Yellow G".

1 part direct red dye: *Colour Index* 327, listed in the above under the generic heading "Benzo Fast Scarlet 4BA".

1 part neutral-dyeing acid blue dye: Prototype 40, having the foreign prototype name "Brilliant Wool Blue FFR".

3 parts glauber salt, anhydrous.

The dye-stain mixture is kept in the form of a dry blend of the powdered ingredients. Storage in the form of a water solution would permit the acetate-dye component to settle out.

No exact concentration of the dry dyestuff mixture need be measured out, but, for purposes of description, let us indicate a range of approximately 1 part of dry dyestuff mixture to 100 parts of water. The amount of dye solution thus prepared should be sufficient in quantity to provide a large excess of dye solution in proportion to the fibers being stained. This assures that no fiber can steal dye from a less readily dyeable fiber by virtue of greater relative affinity.

While the dye solution is being heated to the boil, the unknown sample can be entered wet or dry, without pretreatment,

TABLE I
COLORS PRODUCED ON INDIVIDUAL FIBERS BY THE PRIMARY DYE-STAIN MIXTURE

(*Note*: Method of application of the stain is described in the preceding section, "Procedure". Do not confuse an over-all combination shade such as green, orange, etc, with a mechanical mixture of fibers that are separately colored with different primary hues, as for instance red fibers mixed with yellow fibers, which blend to give an over-all appearance of orange.)

Color Produced On Individual Fibers	*Fibers Possibly Present*	*Outline of Confirmatory Tests* (See corresponding paragraphs in following section).
1) *yellow* (Also, dull or brownish yellows; olive; olive drab)	acetate nylon perlon	1a. *Acetone* dissolves acetate, does not dissolve nylons, perlons. 1b. *Half-strength HCl* dissolves nylons, perlons, does not dissolve acetate. 1c. *Secondary dye staining*, with sodium acid sulfate addition to Primary Dye-Stain mixture. Emphasizes the dullness of shades produced on nylons, perlons, while acetate is stained bright yellow.
2) *orange* (See note at head of this table)	partially saponified acetate (Celcos)	2a. *Repeat the Primary Dye Stain* procedure on fresh portion of unknown and include a control of known viscose rayon. Degree of saponification can be estimated by degree of similarity of orange to red shade on unknown to that on known viscose. 2b. *Acetone* slowly dissolves unsaponified core of the fiber, leaving undissolved the red-stained skin of the fiber, where appreciable saponification had been done.
3) *red* (Including varying depths of red, in shades from scarlet to pink; for yellowish scarlets see #2, orange)	cotton rayons, viscose and cupra, also high-tenacity fully saponified acetate (Fortisan) linen other pure cellulosics (Ramie, etc)	3a. *Depth of red* shade produced by dye stain gives clue to identity, Cupra stained much deeper, Fortisan much lighter than the other fibers listed. 3b. *Microscope* may be required for positive identification of linen, cotton vs mercerized cotton, type of rayon, ramie, etc. 3c. *Secondary dyeing method* with alkaline solution of blue, CI 518, stains only cupra. 3d. *Zinc chloride-iodine solution test* yields blue black coloration on cellulose to characteristic depths and at varying speeds of reaction, depending on physical form of fiber. Using a control of known fibers permits accurate distinctions between rayon, cottons (natural or mercerized), high tenacity rayons, etc. 3e. *Fiber length* can distinguish linen vs cotton.
4) *blue* (Including very deep blues; navy)	silks (cultivated and wild) alkali-damaged wools. (Ordinarily wool is stained green, #5)	4a. *Concentrated HCl* dissolves cultivated silk, does not dissolve wild silk (tussah) immediately, swells wool but does not dissolve it. 4b. *Inspection under good lens* distinguishes coarser, rougher wool from continuous filament silks. Also possible to distinguish cultivated silk from wild silk, the latter being two to three times coarser and slightly rougher.
5) *green** (Includes the normal depths of green; for pale, lime-green, or other yellowish greens see #6)	wool Vicara mohair (and other minor hairs) chlorinated wool other artificial protein fibers made from casein, soya, keratin, peanut, etc	5a. *Caustic soda, 10%*, dissolves wool, mohair, other hairs, within 5 min at boil. Does not dissolve Vicara. Other artificial protein fibers are also swollen to a gell but not dissolved. 5b. *Concentrated HCl* swells wool, mohair, and artificial protein fibers without dissolving them. Obsolete Aralac (casein fiber) is colored violet by the HCl. 5c. *Microscope* is necessary to distinguish mohair from wool, natural hair fibers vs artificial protein fibers, etc, by nature and size of scales, smoothness of artificial fibers, etc.
6) *pale lime green* (Fibers in this class are listed again under #9, "UncoloredFibers" in case their pale color escapes immediate detection)	dynel (Vinyon N) ordinary Vinyon Sarans (vinylidines) Pe-Ce (obsolete German vinyl fiber)	6a. *Shrinking or fusing* in the boiling dye stain solution indicates ordinary Vinyon, Pe-Ce fiber. Dynel and Saran not fused by boiling water. 6b. *Acetone* dissolves dynel, Vinyon, Pe-Ce, but not Saran. 6c. *Monochlorbenzene* dissolves ordinary Vinyon at room temp; dissolves Saran and Pe-Ce at the boil. Dynel is not dissolved, but shrinks to half-size.
7) *brown* (See under yellows, #1)		
8) *black** (Does not include deep blues, navy, etc, see #4)	jute poorly-retted bast fibers protein-coated cellulosic fibers. (animalized cotton, etc)	8a. *Microscope* may be necessary, unless rough, coarse, stiff texture is considered sufficient evidence of bast fibers such as jute, poorly-retted ramie, etc. The latter are not white, and are easily distinguished from protein-treated cotton, which is white and fine. Properly retted ramie is pure cellulose; see #3.
9) *uncolored fibers* (Includes fibers with only a pale or indistinct color due to lack of dye affinity) (Also, fibers from #6, pale lime green, are repeated here)	Dacron (Terylene); Orlon, Acrilan, and X-51 (The three essentially polyacrylonitrile fibers) glass fiber asbestos fiber rubber monofilaments dead cotton Also, from #6, dynel, Vinyon, Saran, Pe-Ce	9a. *Burning test* eliminates glass fiber, asbestos fiber, by their non-flammability. Gives some evidence of rubber monofilament by odor, low degree of flammability of dynel, Saran, and Pe-Ce. 9b. *Secondary dye staining*, with sodium acid sulfate addition to Primary Dye-Stain mixture, (Same as 1c). Puts some characteristic colors on the newer synthetic fibers. 9c. *Secondary dye staining*, with monochlorobenzene as solvent for the Primary Dye-Stain mixture in place of water. Several characteristic colors on synthetics, and elimination of the vinyls (#6) by dissolving them or shrinking them. 9d. *Beta propiolactone* dissolves dynel, and acetate at room temp. At the boil it dissolves Orlon, Acrilan, X-51 (Cyana, Creslan), Vinyon, and Saran. Does not dissolve Dacron, nylon, Perlon, Vicara, rayon, and the natural fibers. (Use caution in disposing of this solvent. Dump it into cold water only.) 9e. *Caustic Soda, 40%*, at the boil. Dissolves Dacron, Vicara in 2-3 minutes. Dynel shrinks considerably and darkens in 15-30 minutes at boil. Orlon, Acrilan, and X-51 soften to yellow-brown sticky gel in 30 minutes. Nylon, perlon unaffected. 9f. *Microscope* may be necessary to prove identity of dead cotton, by its morphology.

* *dull green to greenish black* staining is produced on the staple form of X-51 (see #9), but not on filament form, according to tests made on a limited number of pilot plant samples.

provided it is fairly clean and is relatively free of sizing, oils, finishes, resists, etc. Minor amounts of throwster tints or other pale coloring present on the unknown do not interfere with dye staining. When the sample has been boiled for at least one minute, it can be fished out of the beaker and rinsed in plain water. The dye-stain solution can be used over again once or twice, but it gradually settles out and should be discarded after several tests or after several hours' standing.

If the fabric or yarn appears too light, it can be thrown back into the dyestain solution and boiled a little longer. If it still is not colored properly, it will be necessary to investigate the cause of such failure to dye, whether it be due to presence of a finish or resist, or to the nature of the fiber. This question is taken up in the section on confirmatory tests.

After the first step of dye staining has been done, one takes the stained unknown and literally pulls it apart. Warp and filling yarns are two separate jobs. Each of these is taken in turn and examined under a lens. By tacking down one end of the yarn against a glass slide with a piece of scotch tape, the yarn can then be untwisted enough to expose all the fibers it contains. Under the suggested magnification of 20 to 30 diameters each individually stained fiber can be readily observed.

CONFIRMATORY TESTS

Numbering of the following paragraphs corresponds to the items listed in Table I.

1a) Acetone method for distinction between acetate and nylons or perlons is carried out in a watch glass, which can be mounted beneath a lens or placed on the microscope stage. In this manner, when a blend of acetate and nylon is involved, it is possible to watch the disappearance of the acetate fibers, leaving behind the nylon or perlon fibers. However, it is well to have positive evidence that acetate fibers actually are present by allowing the acetone solvent to evaporate, leaving a yellow tinted film of cellulose acetate on the surface of the watch glass. Ordinarily, the evaporation of acetone is so rapid that the watch glass is chilled to below the dew point and the resulting "sweating" of the glass may slightly interfere with proper inspection of any fibers left undissolved in the solvent. In such a case the condensation of moisture on the watch glass can be avoided simply by holding the glass at some comfortable distance above a hot plate.

1b) The half-strength hydrochloric acid method is used to give positive evidence that nylons or perlons, found to be undissolved in 1a, are correctly identified. Ordinary nylons or perlons are immediately dissolved in cold hydrochloric acid solution made up by combining equal volumes of concentrated HCl and water. Only the bristle-type nylons are slower in dissolving. If so desired, the HCl containing dissolved nylon can be poured into several volumes of water, whereupon nylon precipitates out as a milky or turbid substance.

The different shades of yellow or brown to olive produced by the dye-stain mixture appear to be due to minor physical differences in nylons. Some samples of filament nylon have been found to stain almost as bright yellow as acetate.

Stronger solutions of HCl could, of course, be used in the above test, but concentrations higher than 1:1 approach the acid concentrations that dissolve silk and very rapidly decompose rayons and acetate. It is to be pointed out that the acid used in this test turns the dye stains on all the fibers present to a bright red, except for acetate fibers, which become a little more orange. Once the nylon fibers have dissolved, however, one may tilt the watch glass and drain off the acid solution, then drop a small amount of water on any fibers left on the watch glass, whereupon they return in color to their original dye-stained shade.

1c) Secondary dye staining by means of modifying the Primary Dye-Stain mixture with bisulfate can be used to gain a more pronounced difference in shades produced on the nylons and perlons, as compared with the color produced on acetate. This modification of the Primary mixture is again found useful in identifying the newer synthetic fibers, listed in item 9 of Table 1. Therefore, refer to a description of its use in paragraph 9b.

2a) Repetition of the staining procedure with Primary Dye-Stain mixture, this time with inclusion of a control of known viscose rayon, gives a point of reference by which to judge the degree of surface saponification that the partially saponified acetate sample has had. If all of the skin of the fiber has been saponified, the fiber will pick up about the same depth of red color as that produced on known viscose rayon. Lesser degrees of saponification give shades approaching the yellow shade produced on acetate fibers free from saponification.

2b) Acetone is used to slowly dissolve out the core of a partially saponified acetate fiber. The greater the degree of surface saponification of the acetate, the slower will be the dissolving action of the acetone. With prodding by a glass rod, however, eventually the unsaponified core is dissolved, coloring the acetone with a yellow tint. The subsequent evaporation of the acetone leaves a film of cellulose acetate, as in 1a. Bits of the surface of the saponified acetate fibers or partial shells from the skin of the fiber are left undissolved by the acetone and are stained a dull red shade. For purposes of comparison, a bright acetate filament yarn can be treated for 2 minutes at 120 F in a 1% solution of caustic soda, then rinsed. The saponification thus carried out is sufficient to cause the fiber to be dye-stained a scarlet color, only slightly yellower in shade than the color produced by the dye stain on a known viscose-rayon control.

3a) Depth of red color produced on the cellulosic fibers varies from a deep shade on cupra rayon (Bemberg), almost twice as strong in shade as cotton, down to a weak dull red shade on Fortisan (stretch-saponified acetate), about half the depth of shade on cotton. The other cellulosics range fairly close in depth to cotton. It is occasionally necessary to put Fortisan or high-tenacity rayon fibers back into the boiling Primary Dye-Stain solution for additional staining, so that enough color is produced on them for a proper inspection under magnification.

3b) Microscopic examination may be necessary to give final proof of identity of linen, cotton, ramie, etc. Mounted flat on a slide, moistened with a drop of water and covered with a cover glass, fibers examined under about 200 diameters are easily identified. Cotton has a characteristic flat, twisted, ribbon structure, which is considerably rounded in mercerized cotton. Linen bears markings or faults running across the fiber at intervals, somewhat resembling the joints or breaks in cornstalks; these markings are not readily visible, however, under all lighting, and it is suggested that a drop or two of zinc chloride-iodine solution, as used in test 3d below, be placed on the fibers under the microscope. The gradual development of blue-black color in the fiber is seen first in the joints characteristic of linen. The appearance of rayons under magnification is well known as smooth, very even in diameter, and occasionally having lengthwise streaks, particularly in viscose. Cupra and Fortisan are usually much finer than other rayons. Presence of pigment in rayon is usually evidence of delustrant.

3c) A secondary dyeing method for identifying cupra rayon is carried out with the following solution:

2 parts direct blue CI 518 (Diamine Sky Blue FF)
1 part caustic soda (solid)
1000 parts water.

Immerse the unknown sample, which must be relatively free of sizing, oils, or other finish, in the cold solution above for 3

minutes, then rinse at 120-140 F for 5 minutes. Only cupra rayon fibers will be appreciably stained blue.

3d) The test with zinc chloride-iodine solution is based on a modification of a method given in the *Technical Manual and Year-Book* of the AATCC. Two solutions are made up as follows:

SOLUTION A

93 grams zinc chloride (fused lumps, cooled to room temp).
70 grams water.
This makes about 100 ml of solution having a sp gr about 1.63.

SOLUTION B

1 gram iodine crystals
20 grams potassium iodide
100 ml water.

Test is performed on a watch glass in a fresh mixture of 20 drops of Solution A stirred with 1 drop of Solution B. Use unknown fibers alongside a control consisting of cellulosic fibers of known identity. While observing the appearance of color under a lens, keep prodding the fibers with a glass rod to insure that they wet out in the test solution. Observe relative speed with which blue-black color develops and depth of color—produced after 10 minutes or so. The order in which blue-black color is definitely produced, from fastest to slowest, is as follows:

1) cupra rayon; 2) viscose rayon; 3) other rayons; 4) mercerized cotton; 5) linen; 6) natural cotton.

Amount of blue-black color produced is considerably greater with all the rayons than with the natural fibers. Since the iodine alone would react with starch, yielding the same blue-black color, any cottons tested must be free of starch sizing. A few drops of Solution B diluted with water serves as a good test for starch.

3e) Length of fibers can help to distinguish linen from cotton. The ordinary staple length of cotton runs about 1 inch while linen can be many inches in length, depending on the spinning machinery used in making the yarn. Rayons or other continuous filaments must be absent in this test.

4a) Concentrated hydrochloric acid dissolves silk readily, but in a few minutes other fibers which may be present in a blend are also affected. Acetate and the rayons are quickly degraded, and the nylons are readily soluble in strong mineral acids. See also test 1b above.

4b) Presence of scales on wool fibers gives them a rougher appearance even under a lens of only 20-30 diameters, especially in contrast with silk, which is fine and smooth. Tussah (wild silk) has a rougher structure than true cultivated silk, appearing somewhat like a bundle of closely bound fibrils.

5a) Caustic soda solutions, besides dissolving wool and true silk, cause swelling of artificial protein fibers. Acetate, which may be present, will of course be saponified, losing its original identity.

5b) The coloration of the obsolete Aralac casein fiber by concentrated hydrochloric acid is now of only minor academic interest. The strong violet color appears in 5 to 10 minutes; it is not common to other artificial protein fibers. The color is immediately discharged on rinsing with water, but returns upon contact with any strong acid solution thereafter.

5c) Mohair has shorter scales than sheep wool, more to the inch, and the scales do not protrude so far from the surface of the fiber. Minor hairs, such as rabbit, have totally different microscopic appearance from wools.

6a) Ordinary Vinyon and the obsolete German Pe-Ce fiber have melting points below 212 F, hence are fused in boiling water. Dynel contains 40% acrylonitrile and is therefore higher melting than the ordinary vinyl fibers.

6b) Acetone is an effective solvent for vinyl fibers, but needs somewhat more time and prodding to dissolve dynel because of the acrylic content of dynel.

6c) Monochlorobenzene, like many other organic liquids, has an index of refraction which causes an odd optical effect. Certain transparent substances, such as textile fibers, seem to disappear from view when immersed in liquids having an index of refraction similar to that of the fiber. Obviously, therefore, do not permit disappearance of a fiber in a solvent to be mistaken for solution of the fiber.

8a) Poorly retted bast fibers resemble blades of grass or stems of plants, and are not likely to be confused with textile fibers. Jute is about the only common bast fiber in important commercial use, and its coarse, stiff texture and yellowish color are easily recognized without the use of lenses.

9a) Burning tests can only be used as rough checks on fibers, since traces of blended fibers could easily influence odor of burning, melting, and other phenomena, such as ash formation. Most of the synthetic fibers are thermoplastic, hence they melt before they burn. Dynel, Saran and PeCe fibers contain enough chlorine to be self-extinguishing when removed from a flame.

9b) As used in 1c, modification of the Primary Dye-Stain mixture with bisulfate yields several distinctive colors on fibers. Proceed as follows:

1 part Primary Dye-Stain mixture (dry)
1 part sodium acid sulfate
100 parts water.

Boil the unknown a full minute or two, rinse in cold water. It is suggested that this staining be done alongside a control sample containing known fibers. Present results indicate that nylon is stained a yellowish brown, dynel is stained fairly strong green, Dacron is somewhat yellower and paler, while the acrylics (Orlon, Acrilan) pick up a light brownish grey. Unfortunately, this modification of the dye stain destroys all distinction, so far as color staining is concerned, between silks, wool, Vicara, and jute, all of which stain deep blue-black.

9c) The use of monochlorobenzene as the solvent for the Primary Dye-Stain mixture in place of water stains Dacron appreciably yellow, leaves Orlon and Acrilan practically unstained, and shrinks dynel to about half its original length while coloring it strong blue. Saran and ordinary Vinyon are dissolved by the solvent, and acetate is melted down to a fused mass with dull green-blue color. Nylon is colored bluish green. The dyeing should be done in a small beaker on a hot-plate with boiling for a minute or two, and the fibers should then be placed quickly into a water solution of a synthetic detergent to remove solvent.

9d) Betapropiolactone, available from Goodrich Chemical Co, is to be used with caution because of its reactivity with water. In disposing of used solvent, pour it into a large volume of cold water. As listed in Table I, it is a good solvent for the acrylic fibers but not for Dacron.

9e) Caustic soda, 40% solution, boils with some bumping, hence should be well covered while in use. Dacron disintegrates rapidly in it at the boil, but delusterant pigment cements the mass together for a short time, unless it is stirred with a glass rod.

9f) Dead cotton has about the same flat, twisted-ribbon appearance under the microscope as natural mature cotton, but the dead cotton fibers are much thinner and more twisted. They usually are found in a tangled mass clinging to a yarn like a ball or "pill".

INDEX TO FIBERS

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Celcos. See: acetate, partially saponified	2
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Western New England Section Meeting Report

March 20, 1953

Rapp's Restaurant, Shelton, Conn

A MEETING of the Western New England Section was held on March 20, 1953 at Rapp's Restaurant, Shelton, Connecticut. The technical program consisted of a talk by Andrew J Gard of the Bersworth Chemical Company on "The Chemistry and Application of Chelation."

Seventy members and guests were present.

Respectfully submitted,

N J GLADE, *Secretary*

Mid-West Section Spring Meeting Set for April 18

THE Spring Meeting of the Mid-West Section will be held April 18th at the Netherland Plaza Hotel, Cincinnati.

Featured speaker of the afternoon session will be Dr R P Monnier, Cincinnati Chemical Works, on the subject "An Introduction to Dyestuff Manufacture".

R E Wolfrom, Rohm & Haas Co, will discuss "Some Aspects of Detergency and Detergency Testing" at the evening session.

"Fats" and "Leans" to Vie in Softball at Piedmont Section Outing

A SOFTBALL game between the "fats and the "leans" at the Blowing Rock High School baseball field on Saturday morning, June 13th, will highlight the Piedmont Section's summer outing at Blowing Rock, N C, it is learned.

The annual golf tournament will commence on Saturday morning.

For the ladies, there will be a trip to the Cone Estate, a bridge tournament and horseback riding.

Hudson-Mohawk Section ——

THE QUATERNARY AMMONIUM SALT... A VERSATILE NEW CHEMICAL FOR TEXTILE PROCESSING*

PAUL D JACOBS
Onyx Oil & Chemical Co

INTRODUCTION

THE description "cationic" or "cation-active", as applied to textile finishing compounds is undoubtedly familiar to most of you here. Possibly a few of you have been unhappily introduced to cationics the hard way—by making an ill-advised attempt to mix a cationic and an anionic in the same bath and ending up with an insoluble mess.

On the more constructive side, industry has come to accept cationic products as softeners with substantivity and considerable durability. Additional valuable applications for cationic compounds have been developed in such widely diversified fields as durable water-repellents, dullers, dye fixatives, resins and so on.

I would like to invite your brief attention to the rather interesting properties of the quaternary ammonium salts, a group of cationic compounds hitherto comparatively unknown to the textile industry.

GENERAL

The quaternaries, as these compounds are familiarly dubbed, have already found valuable applications in fields outside of our own (*1*). During the past decade they have secured an important place as general and medicinal disinfectants and deodorants, and are widely used in many food industries, such as fisheries, bakeries, dairies and so on.

The Onyx Oil & Chemical Company has pioneered in the development and application of these compounds and today occupies a leading position in their manufacture and distribution. We have now found that the quaternaries possess a number of properties which forecast a diversity of profitable uses for the textile finisher and dyer. The recommended applications include (a) sanitized finishes, (b) textile-deodorizing finishes, (c) mildew-resistant finishes, (d) antistatic finishes. Three of the more promising of these quaternaries are being marketed for the textile industry under the trade name Catex.

CHEMISTRY —— Before we go into each of these applications, a few words as to the chemistry of the quaternary ammonium salts.

Paul D Jacobs

A quaternary ammonium salt can be considered as having been derived from ammonium chloride by substitution of organic radicals for the hydrogens in the ammonium cation. These organic groups give cation activity to this cation, out of which arises an affinity for many textile fibers. By selection of the proper substituents for the quaternary compounds, it can be used to impart a desired degree of one or more of the following properties of a textile: bacterial resistance, mildew resistance, softness, odor prevention, and leakiness for static electricity.

A hint as to the chemical structure of these compounds is provided by the name "quaternary ammonium"—that is, they may be considered as organic derivatives of ammonium salts. The ammonium chloride molecule can be depicted as follows:

$$[NH_4]\,Cl \rightleftarrows [NH_4]^+ + Cl^-$$

As you can see, it ionizes to give the positively charged ammonium ion and the negatively charged chloride ion. However, the molecule is neither cation-active nor anion-active, since both the positive and negative ions are hydrophilic, or "water loving". A typical cation-active quaternary ammonium salt, namely, cetyl dimethyl benzyl ammonium chloride, can be expressed as follows:

$$N(C_{16}H_{33})(CH_3)_2(C_6H_5CH_2)\;Cl \rightleftarrows [NR_1R_2R_3R_4]^+ + Cl^-.$$

All the hydrogens in the original ammonium chloride have now been replaced by organic groups, and the ionization provides a positively quaternized ammonium ion and negative chloride ion. The molecule is now cationic or cation-active, because the positively charged ion is hydrophobic, or "water hating", as a result of the attachment of organic groups.

The valuable textile applications of the Catex compounds arise in part from their ability to adhere tenaciously to vegetable matter. Application of small concentrations of these compounds by conventional dyehouse or finishing methods results in the deposition of a very tightly bonded film of the material, which imparts good durability for the effects achieved.

USES

FABRIC SANITIZATION —— Pathogenic bacteria may in general be deposited on textile articles in various ways: for example, they may be air-borne, deposited along with dirt, carried by soil, or picked up from infected persons.

The literature, (*2*), (*3*), and (*4*), abounds with references to the ability of the quaternary ammonium salts to inhibit the growth of many pathogenic bacteria when present on cloth. This so-called sanitizing effect is resistant to leaching by water and to dry cleaning but not to washing. The sanitized finish may therefore be described as a finish which substantially reduces the tendency of a fabric to transmit pathogenic bacteria to persons.

The pad application of a 0.1%-active solution of Catex P-18 to an acetate-viscose gabardine suiting resulted in a marked inhibition of bacterial growth. The bacterium in question was *Staphylococcus aureus*, a common cause of boils and pustules in human beings. The bacteriostatic tests were conducted in accordance with a modified Food & Drug Administration technique. The treatment was equally successful on both unfinished cloth and on cloth that had been previously finished with a crease-proofing resin.

* Presented at Jack's Restaurant in Albany, N Y, on Oct 3, 1952.

A little thought will point to a number of important applications for such a sanitized finish. Hospitals, surgical rooms, and dental offices, as well as dairies and other food-processing establishments, furnish numerous examples for which apparel can usefully be sanitized. The value of the finish is enhanced by the fact that it accomplishes its purpose with no undesirable skin irritation.

FABRIC DEODORIZATION — Somewhat related to the bacteriostatic action of the quaternaries is their unique textile-deodorizing action. It is a well known fact that certain unpleasant odors result from many varieties of bacterial decomposition. To the extent that the quaternaries prevent the growth of such bacteria, they also will prevent the formation of odors resulting from bacterial metabolism. However, the action of the Catex compounds on many odors appears to go far beyond the mere interruption of metabolism. The mechanism of this type of odor suppression is not well understood.

The deodorization provided by Catex compounds is superior to the so-called *masking*-type deodorant, a type which merely covers an unpleasant odor with a pleasant one. The Catex compounds suppress odors without imparting any odor of their own. Catex-treated apparel has shown a marked ability to resist the odors associated with body perspiration. Success has been reported in suppressing the well-known fishy odors developed from urea- or melamine-resin finishes, when stored in damp, warm, poorly ventilated environments. This was accomplished by after-padding the cured cloth with a dilute solution of Catex P-50. Whether this can be accomplished by incorporating the Catex into the resin finish itself has not yet been determined.

MILDEW-RESISTANT FINISH——The similarity of a mildew-resistant to a sanitized finish is clear. In both cases the cloth is treated to inhibit the growth of microorganisms. However, the similarity ends at this point. The sanitizing treatment is directed toward the protection of the wearer of the apparel from the effects of pathogenic bacteria; the mildew-resistant finish protects the fabric itself from fungus disintegration.

Catex P-50 has been tested for mildew-proofing properties on cotton twill in accordance with Army Quartermaster Corps Specification 100-17 with the cellulose-decomposing mold *Chaetonium globosum*. Pad application of a 1%-active solution of Catex P-50 followed by drying resulted in complete mildew resistance in accordance with the definition of the specification.

ANTISTATIC ACTION —— As a result of the many processes through which a textile material is put in the various stages of production, a static charge may be developed, which can prove extremely troublesome to the processer. This effect is somewhat dependent on operating conditions but has become a very difficult problem with the advent of the newer synthetics characterized by low moisture regain. Existing laboratory test methods leave much to be desired in the measurement of the antistatic effect of various agents on textiles. It is as yet rather difficult to relate such test data to the results obtained under the vaguely defined conditions of mill application. The results of several mill trials have provided a qualitative indication of the value of Catex P-50 in suppressing static charges.

The three Catex products that have been referred to in this paper are Catex P-50, P-18 and P-12. They are each 50%-active water solutions of a particular quaternary. They are readily diluted with cold water for application. Certain limitations should be mentioned with regard to their use. They must be applied only to cloth which is thoroughly scoured and completely free of anionic materials, such as anionic surface-active agents, sulfonated oils, or soaps. Similarly, such materials must not be combined with the Catex products in the same solution. On the other hand, the Catex products may be freely used in combination with other cationic surface-active agents or with nonionic agents, and in the presence of moderate-strength alkalis and acids.

SUMMARY

Preliminary information on four valuable textile applications of quaternary ammonium salts has been presented, namely, as a sanitizing finish, as a deodorizing agent for textiles, as a mildew-resistant finish and as an antistatic agent. While the information is admittedly incomplete at the present time, it is hoped this presentation will stimulate further investigation by the very able research workers in our industry.

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New York Section——

THE IDEAL MILITARY FABRIC*

J FRED OESTERLING

Quartermaster Research and Development Laboratories

INTRODUCTION

IF one were able, by some magic of science or legerdemain, to produce the ideal military fabric, such a fabric would have the following characteristics:

1) It would be light in weight, with high warmth-retentive qualities in winter, and cool in summer.

2) It would have high strength, wear and tear characteristics, good sewability, drape and hand.

3) The fabric would be wind-resistant, waterproof (not just water-repellent) to keep the wind, rain and moisture out; and it would be moisture-vapor permeable to allow the moisture from the body to escape.

4) Our ideal fabric would be fire-resistant or, better still, fireproof and a very poor conductor of heat to protect the soldier against thermal hazards.

5) It would be immune to microbiological attack and have bacteriostatic properties.

6) This fabric would be shrink- and distortion-resistant, resistant to soiling, and readily cleansed by laundering, quick-drying and wrinkle-resistant.

7) It would be easily dyeable by conventional methods, washfast, crockfast, and colorfast to sunlight and weathering.

8) And, while we are dreaming, this super fabric would act like a chameleon, changing color with background and terrain for perfect camouflage.

9) Finally, this magical material would be resistant to chemical agents and, last but not least, bullet-proof.

A real pipe dream! Yet, every one of the characteristics mentioned has some bearing on the make-up of the clothing ensembles worn by our military personnel.

REQUIREMENTS FOR MILITARY TEXTILES

To cope with environmental conditions the soldier's clothing must cover the range from broiling desert sun to deep arctic cold, from torrential rains to blizzards, plus biological and microbiological hazards. Add to this, natural fire hazards, such as overheated stoves, glowing embers, lighted cigarettes, plus military hazards of napalm, flame throwers, white phosphorus, jellied gasoline, fragmentation bombs, and chemical agents, and all of the qualities listed for our ideal fabric become factors in Quartermaster Research and Development activities.

J Fred Oesterling

An idealized fabric is considered from the standpoint of those characteristics that would have to be incorporated into a single fabric to meet military performance requirements. The extent to which this has been accomplished in Quartermaster textile items and the extensive evaluation program through which most new developments must pass before being accepted for military usage are discussed. Special attention is given to two areas of textile research, namely, water repellency and blended fabrics, where problems of vital interest to Quartermaster Research and Development Laboratories remain unsolved.

Figure 1
Hot-Wet Uniform

For each of the functional characteristics desired there is available or can be made available to the military a finished fabric which represents a positive answer. In some cases this answer may fall far short of military requirements, in others the results obtainable are extremely satisfactory. For example, the solution to the problem of shrinkage, which used to be a major one, especially in woolen items, is approaching the optimum. However, this very case serves as an excellent illustration of why no one has been able to produce the single ideal fabric. Problems in dyeing, loss in hand, effect of the treatment on wear-life and aging characteristics were some of the side reactions that had to be overcome before shrink-resistant military woolens became a reality.

Almost invariably the enhancing of one or more desirable characteristics in a fabric is accomplished at the expense of some other essential property. For example, if we alter the fiber content or finish of one of our standard fabrics to augment some functional quality, sewability or tailoring may become a problem. A special lubricating finish may be added to improve sewability, and immediately several questions arise. Will this finish have a deleterious effect on the aging characteristics of the fabric or sewing thread? What will happen in dry cleaning and pressing, and in storage? Or we may change the construction of one of our cotton fabrics to a looser weave to improve its tear or abrasion resistance, and the result is a decrease in water resistance. In our goal towards the ideal fabric we are constantly faced with compromise in order to attain the best balance of performance characteristics. Notable progress has been made, however, in combining not all but many of the desired properties into one fabric. Several examples could be cited in which shrinkage resistance, fire resistance, colorfastness, camouflage, reduced weight, and adequate strength and wear resistance have been in-

* Presented at the Statler Hotel in New York on Jan 30, 1953.

Figure 2
Cold-Dry Field Combat Uniform M-1951

corporated into a single military fabric.

In the absence of an ideal fabric having all the functional qualities we have enumerated, military requirements are being met by the selection or development of fabrics which, when used in the proper combination, afford the soldier protection against the elements and a measure of defense against military hazards. But protection against environmental and military stresses is not enough, for the man must be able to perform effectively as a soldier. His clothing and equippage must not restrict his maneuverability and must impose upon him a minimum of physical and physiological stresses. These are important considerations in the development of new fabrics or textile end items for the military. Specifically, the matter of weight of textile fabrics as it affects both the load on the man and supply channels is high on the list of factors to be taken into account. In this connection Quartermaster research personnel are instructed to, "Make it lighter; make it better; make it last longer."

As indicative of the wide range of conditions under which the soldier may be called upon to operate I would like to direct your attention to Figures 1 and 2 showing extremes in clothing ensembles: the hot-dry and cold-dry uniforms. The hot-dry consists of two layers of 6.0- and 4.0-ounce fabrics; the cold-dry of a number of layers ranging in weight from 1.8 to 16.0 ounces per square yard. While the fabrics for the hot-dry ensemble weigh the equivalent of 10 ounces per square yard, the combined weight of the cold-dry is approximately 90 ounces per square yard.

As can be seen, the two uniforms vary widely in weight, type of fabric and number of layers. However, we have taken a step towards an ideal ensemble (if not the all-purpose fabric) by designing multilayer garment ensembles that can be used over a wide range of climatic conditions and geographic areas simply by the addition or removal of parts of the ensemble. Another step towards universality in clothing has been effected by reducing the total number of garment sizes in certain items of combat apparel by as much as 50 per cent. Better fabrics, garment redesign, and the application of anthropometric data have made possible this reduction without loss of fit or freedom of action.

EVALUATION OF MILITARY FABRICS

In any effort designed to bring about fabrics having superior performance characteristics, evaluation of new developments must be an essential part of the program. Everyone knows that laboratory test methods are subject to limitations and that the results obtained often do not predict usage or field performance. Hence, the Quartermaster Research and Development Laboratories have placed considerable emphasis upon field or simulated user tests of military items.

Our approach to this phase in the development of better fabrics is threefold: 1) Production of one or two prototypes for

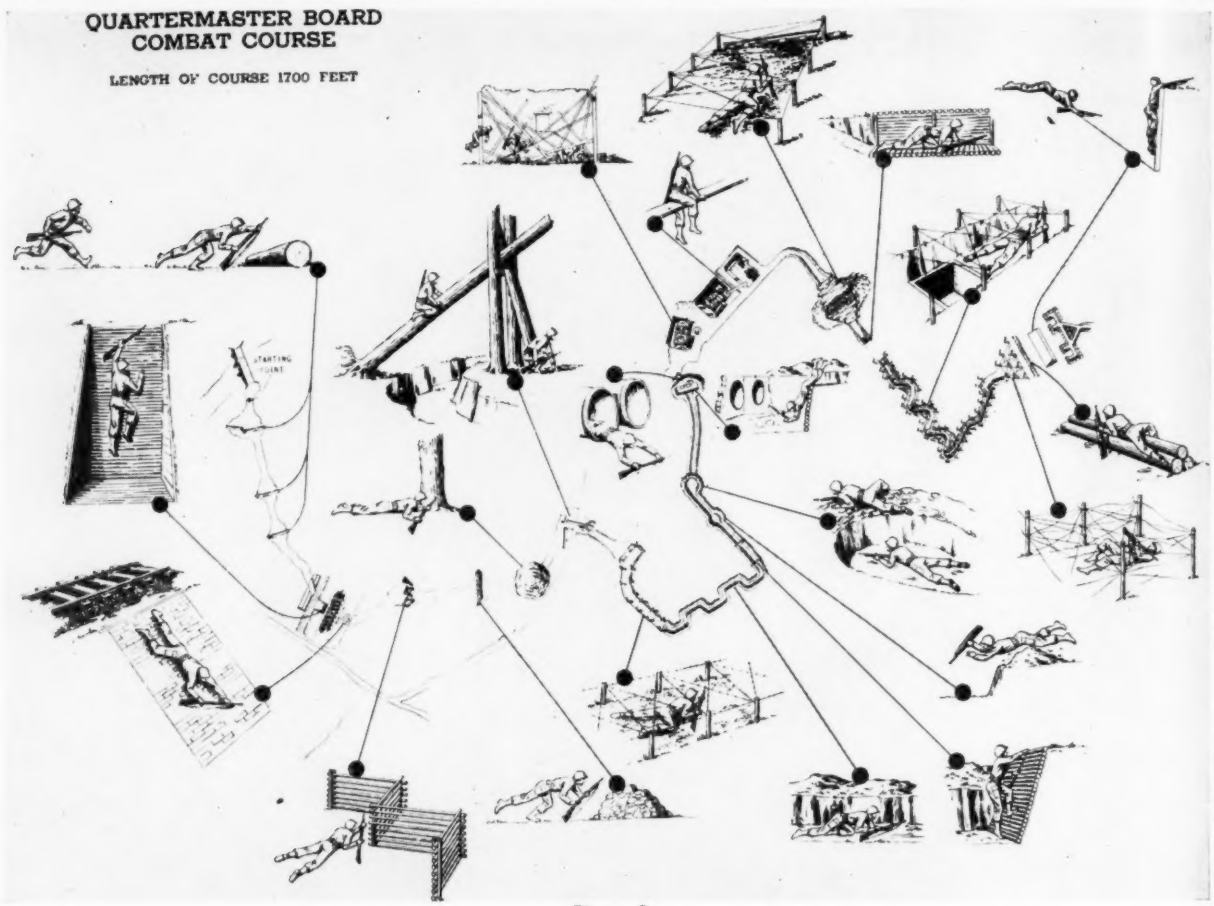

Figure 3

study and test on an extremely limited basis. This is best described as a "quickie" test where the interested technologist examines the item under the best available simulated user conditions. 2) The second phase in the program is a controlled field or engineering test designed to yield statistically valid results with a minimum number of test specimens. These tests are conducted by the Quartermaster Board under appropriate environmental conditions. Test stations for this purpose are at Fort Lee, Va; Mt Washington, N H; Yuma, Ariz; Fort Sherman, Canal Zone; and Fort Churchill, Manitoba, Canada. 3) The third and final step is actual troop user tests involving several hundred or thousand items.

In order to illustrate the magnitude of the Quartermaster Research and Development Laboratories' evaluation program (a program which is mandatory because of the millions of yards of fabric involved) I would like to discuss rather briefly the field testing programs just mentioned.

The Quartermaster Board at Fort Lee, Virginia, conducts carefully controlled tests through enlisted personnel who use the test item or items under simulated field conditions. For this purpose an obstacle course, as depicted in Figure 3, is employed. This course is used principally for wear-resistance studies. A shoe track for the evaluation of footgear and a rain course for testing the water resistance of rain wear are among the facilities available. An exposure station for studying the resistance of fabrics and finishes to sunlight and weathering is also maintained at Fort Lee. Provisions have been made for the evaluation of practically every textile and clothing item from shoelaces to tents. The Quartermaster Board does not confine its activities to textile and clothing items but covers the entire field of Quartermaster Corps supply responsibilities from laundry detergents and plastic mess trays to field cooking and baking facilities, refrigeration and mobile shower baths.

The Quartermaster Board Detachment at Mt Washington, New Hampshire, is concerned principally with troop use of cold-climate items. As such it may run the gamut from C-rations to immersion heaters, from new footgear to sleeping bags. Field or engineering tests are not limited to the two stations mentioned. For example, winter tests are also conducted at Fort Churchill, Canada, and outdoor weathering is carried out at Miami, Florida and Montezuma, Chile. Much more might be said about laboratory and field testing facilities; however, that which has been covered will serve to indicate the extent of the program.

It had been originally suggested that this talk be devoted to unsolved Quartermaster Research and Development textile problems. Up to this point I have dealt with this subject in terms of the broad aspects of our textile research and in terms of the general objectives of our approach towards ideal military fabrics. There are, however, two specific areas which I wish to touch upon briefly; the first, blends of synthetics with natural fibers, and the second, water resistance and water repellency.

MILITARY USE OF SYNTHETICS

In the event of a full-scale emergency it is a foregone conclusion that the wool supply in the foreseeable future will not

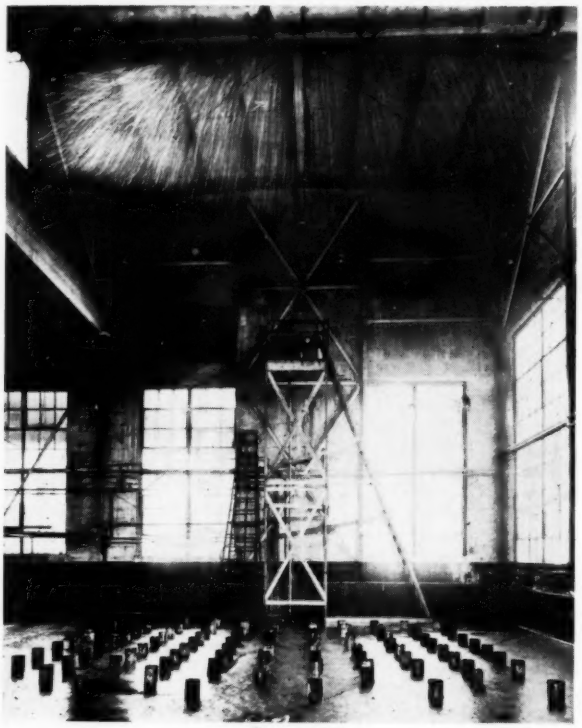

Figure 4
Rain Room

meet military and civilian needs. So without regard to the relative merits of all-wool, all-synthetic, or combination textiles, blended fabrics are of considerable interest to the Armed Services.

The individual manufacturer who is interested in blends for civilian uses is free to select whatever fiber or combination of fibers he chooses, adjusting his processing techniques to meet his needs. The problems of the Quartermaster Research and Development Laboratories in this connection are much more complex. The selection of one or more synthetics must be based on sound supporting data.

What percentage of synthetic should be used? What dye technique will produce satisfactory results? How should the fabric be finished? Can it be sewn and tailored properly (on a mass-production basis)? Will its performance in use meet military requirements? These are only a few of the questions that confront us in connection with fiber blends. In an effort to answer some of these questions the Quartermaster Research and Development Laboratories are carrying on both basic and applied research studies in fiber and fabric properties.

Through the co-operative efforts of industry a series of blended fabrics has been produced. These fabrics, which include various percentages of synthetics blended with wool, are at present undergoing study in the Quartermaster Research and Development Laboratories. However, our investigations are not confined to blends of synthetics with wool. Consideration is also given to possible advantages that may be gained by the blending of synthetics with cotton. The work which needs to be done in the field of blended fabrics is of such magnitude that the Quartermaster Corps must look to industry and outside research organizations for many of the answers.

WATER RESISTANCE AND REPELLENCY

The second problem to which I wish to call your attention is that of water resistance and water repellency. During the war and in the postwar period to 1948 the Quartermaster Research and Development Laboratories carried on an extensive program in the field of water repellency and water resistance.* The effect of fabric structure, including type of weave, cover factor, thickness and yarn twist, on resistance to penetration was investigated. The chemical and physical-chemical aspects of water repellency were studied. This program, which involved laboratory, pilot-plant and actual plant studies, was designed to develop information on the basic principles of water resistance and water repellency. To this end research contracts were established with the Institute of Textile Technology and the Harris Research Laboratories. Industry aid was also enlisted both from the manufacturers of water-repellent compounds and from textile mills. The Quartermaster Research and Development Laboratories maintained a staff of eight scientists and technical aides, who were actively engaged in the conduct of laboratory phases of the investigation and were responsible for following the work of the research contractors.

As a realistic means of evaluating new developments in the field of water resistance and water repellency and as a research tool, a rain room, Figure 4, which simulated rainfall at the rates of 0.1, 1.0 and 3.0 inches per hour, was established at the Philadelphia Quartermaster Depot. As mentioned previously, an outdoor rain course, Figure 5, was also installed at the Quartermaster Board, Fort Lee, Virginia.

In addition to the basic studies, pilot-plant runs were made on some 40,000 yards of standard military cotton fabrics to establish the level of water-repellency performance obtainable from textiles made under practical plant operating conditions.

The results of these extensive investigations led to the conclusion that basic principles of water resistance and water repellency had been established, and that data had been developed as to the levels of water repellency performance attainable. With this information as a basis for the design of fabrics and for setting specification levels it was decided in the fall of 1948 to curtail further research in this field, to translate into practice available data and knowledge, and to concentrate the released scientific manpower on other more pressing problems.

Confident that we should be able to get a higher degree of water resistance and water repellency than had been obtained on prior procurements, specification requirements were revised upwards. However, results have fallen far below expectations. This situation did not arise as a result of the basic investigations and data being in error (for the fundamental principles of high cover and tightness factors and controlled application of water repellent are still valid) but because of failure of industry to meet performance levels especially under highly competitive conditions.

Because of the inability of the Quartermaster Corps to obtain durable water-repellent fabrics which meet desired levels of performance, considerable effort is being devoted to finding ways and means of overcoming this difficulty. The seriousness of the situation with respect to water-repellent

* A distinction is made between water resistance and water repellency. Water resistance refers to those characteristics of a fabric, such as weight, thickness, tightness of weave and swelling properties of the fiber, which contribute to impedance of water through the fabric. Water repellency is used in reference to the hydrophobic characteristics imparted to the fibers and fabric through the application of a durable or nondurable water repellent.

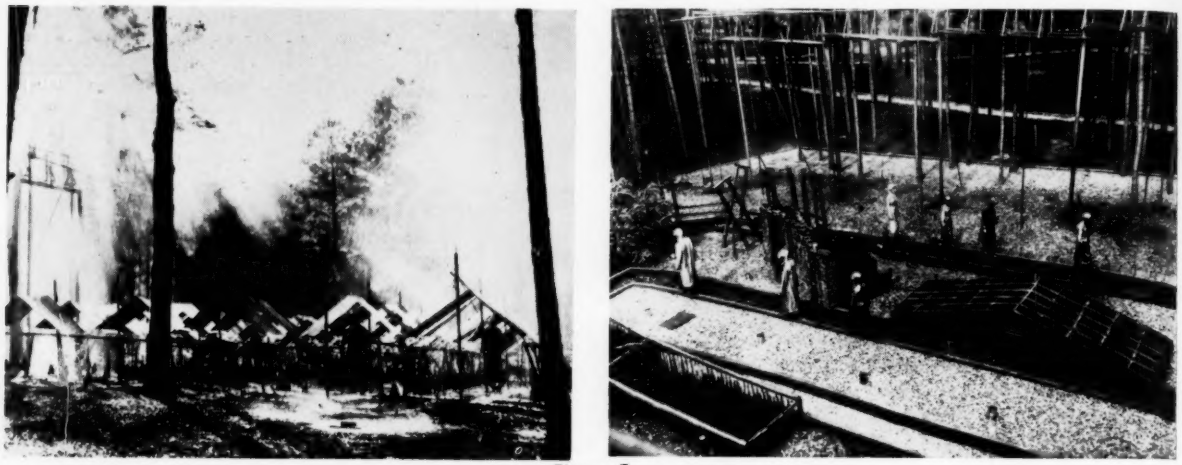

Figure 5
Rain Course

cotton fabrics becomes apparent when one considers the fact that, under stress of combat conditions, retreatment of outer garments is frequently not possible in field laundries. This emphasizes the need for a really durable treatment.

The problem of water-resistant and water-repellent cotton fabrics, for which there appeared to be a satisfactory solution four years ago, now requires re-evaluation. It presents a very definite challenge to textile weaving and finishing mills to improve upon today's over-all results. It should be said in fairness, however, that a number of mills have produced fabrics which met and even surpassed our highest specified levels of performance. These mills have been in the minority. Nevertheless, they have demonstrated that military fabrics with better water-repellent characteristics are feasible.

CONCLUSION

We are constantly striving for improved textile materials, for fabrics which will come as far as practicable to being ideal, at least for a given situation. Progress in the development of better military textiles and clothing items during the past ten years has been gradual. Nevertheless, very substantial advances have been made. Improved fire and mildew resistance, lighter weight and longer wear, better shade and color performance, shrink-resistant wool fabrics, improved shrinkage control in cotton knit goods, and wool-nylon blends are among accomplished facts.

Greater versatility in fabrics and textile items has been effected by developing garment assemblies to serve in more than one capacity. A further step towards universality has been accomplished by reducing the total number of garment sizes in certain items of combat clothing.

Much of the credit for the development of military fabrics that approach the ideal must be given to industry. It is only through the help of industry and outside research organizations that we may hope to attain better textiles for the military.

Our research on textiles and textile end items has as its goal an increase in the comfort, well-being and effectiveness of our soldiers. This goal is not only humane, but militarily expedient, because we recognize that every improvement in the soldier's effectiveness as a fighting man is tantamount to an increase in manpower. Thus we feel that our striving for ideal military fabrics, in cooperation with industry, makes a significant contribution to the country's defense.

LTI Student Chapter Meeting Report

March 19, 1953

Lowell, Massachusetts

PHILIP E MacLean, Onyx Oil & Chem Co, spoke on "Problems Involved in Technical Sales" at the seventh meeting of the Lowell Textile Institute Student Chapter on March 19, 1953.

Plans were announced for the annual joint meeting of the Chapter and the Northern New England Section. The afternoon program will commence at 5:00 with a student panel discussion of "The Chemistry of Dyeing with Metallized Acid Dyes." Dinner will be served in the cafeteria at 6:30 P M, after which the following papers will be given by Lowell Textile Institute graduate students: "Quantitative Analysis of Dacron Blends", "Substratum Form in Wool Dyeing", and "Time—Temperature Effects on Dacron."

Respectfully submitted,
HARVEY M FISHMAN
Secretary

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Southeastern Section Meeting Program

THE next meeting of the Southeastern Section will be held at the Biltmore Hotel, Atlanta, Ga, on April 18th.

The afternoon technical session will feature a talk on "Sequestering Agents" by Nesbit Johnston, Geigy Co, Inc, after which a technical representative of The Chemstrand Corp will discuss "Dyeing of Acrilan Fiber."

The evening session, following dinner in the Pompeian Room, will feature a film entitled "Jungle Errand", which covers a recent trip to South America by Paul Seydel, Seydel-Wolley & Co.

Meeting Dates New York Section 1953-54 Season

THE following dates have been selected for meetings of the New York Section during the 1953-54 season:

September 25, 1953 — Kohler's Swiss Chalet, Rochelle Park, N J

October 23, 1953—Kohler's Swiss Chalet, Rochelle Park, N J

November 20, 1953 — Kohler's Swiss Chalet, Rochelle Park, N J

January 29, 1954—Hotel Statler, New York, N Y

February 26, 1954—Hotel Statler, New York, N Y

April 23, 1954—Kohler's Swiss Chalet, Rochelle Park, N J

May 21, 1954—Kohler's Swiss Chalet, Rochelle Park, N J

NEWS

April 13, 1953

• Sixth Annual AIEE Northern Textile Conference

The sixth annual Northern Textile Conference of the American Institute of Electrical Engineers will be a feature of the North Eastern District Meeting of the Institute at the Sheraton-Plaza Hotel, Boston, Mass, April 29-May 1.

The all-day textile conference will be held the last day (May 1). The program will include four papers dealing with electrical engineering and textile manufacturing, and a luncheon at which Robert Browning, of the New York management consulting firm of Booz, Allen & Hamilton, will speak on "Can the Textile Industry Afford Engineers?". R J De Martini, chief development engineer of F C Huyck & Sons, Rensselaer, N Y, will act as toastmaster. V F Sepavich, Crompton & Knowles Loom Works, will preside at both morning and afternoon sessions.

S O Cowan heads the AIEE Textile Subcommittee, sponsors of the Conference.

• NICD Discontinues Dyeing Service at Silver Springs

The National Institute of Cleaning and Dyeing, Silver Springs, Md, has announced the discontinuation of its Dyeing Department "because of the technically specialized and peak-season nature of garment dyeing". They are said to feel that, without the ability to render adequate attention to dyeing, they do their members a disservice to keep them waiting for long periods during the height of the season.

Dyeing problems and service are referred to the Garment Dyers Guild of America or one of its members. Headquarters of the Guild are in the offices of Allan J Copeland, Executive Secretary, Room 710, 520 N Michigan Ave, Chicago 11, Chicago, Ill.

• Acme-Hardesty Names Ohio Agent

Acme-Hardesty Co (formerly Hardesty & Co), New York, has announced the appointment of Hukill Chemical Corporation, 2533 Broadway, Cleveland 13, O, as its agent in the northern Ohio territory.

Hukill will reportedly service all Acme-Hardesty accounts in the area, handling a complete line of fatty acids, hydrogenated oils and glycerine. Warehouse stocks of some of these items will be carried at a later date in Cleveland by Hukill Chemical Corporation.

• Pittsburgh Coke & Chemical Opens Philadelphia Sales Office

Pittsburgh Coke & Chemical Company's Fine Chemicals Division has opened a sales office to serve the Philadelphia territory, which includes Pennsylvania, New Jersey, Delaware, Maryland, and Virginia.

Address of the new office will be Room 203, 29 Bala Avenue, Bala-Cynwyd, Pa. Sales supervisor is Boyce C Bond. The new office will expedite shipments of dyestuff intermediates from the firm's Philadelphia warehouse.

• TCMA Offers Prize for Best Representative Seal

The Textile Chemical Manufacturers Association, Inc, seeking a seal which will be representative of the organization and its membership, has offered a $100 prize for the best design submitted by students of 10 textile schools in this country.

The contest will close April 30 and the prize will be presented at a dinner of the TCMA in New York, N Y, on May 15.

Schools were limited to those with student chapters of the American Association of Textile Chemists and Colorists. They are: Bradford Durfee Technical Institute, Clemson College, Fairleigh Dickinson College, Georgia Institute of Technology, Lowell Textile Institute, New Bedford Textile Institute, North Carolina State College, Philadelphia Textile Institute, Utica Technical Institute, and Rhode Island School of Design.

The Association gave competing students the following background:

It was organized in 1931 as the Sulphonated Oil Manufacturers' Association, Inc, by processors of oils for both the tanning and textile industries. In 1942 to express more adequately its field of activity, the Association changed its name to Processing Oils and Chemicals Association, Inc. Then late in 1952 the present name was adopted. At this time the primary objectives of the association were defined in detail in its bylaws, the most important of which is the pledge of every member, and a condition of membership, "to practice honesty and integrity in all dealings and to maintain the quality claimed for each product manufactured".

The judges for the contest, whose decision will be final, are:

Lucien Bernhard, designer, Lucien Bernhard Studio, New York; Arthur Louis Finn, industrial designer, New York, and Norman Alben Johnson, American Dyestuff Reporter.

The seal is intended to be used by the Association on its letterheads and members are anticipating its use not only on stationery but on shipping containers.

• Fairleigh Dickinson Seeks Equipment

The Textile Department at Fairleigh Dickinson College, Rutherford, New Jersey, is in need of additional laboratory, machinery and model equipment for its textile and chemistry students. Among the items needed are: Fade-Ometer, Launder-Ometer, Suter single-strand tester, small curing oven, small demonstration model of a jig dyeing machine, wool sample card (table model), humidifier for testing room, cloth perch or inspection machine, Taber abrader, Mullen tester, Emerson conditioning oven, Universal yarn numbering balance, power twist tester, yarn evenness tester, sample printing machine, small ager, Universal bobbin winder (4 or 6 spindles), laboratory sample dryer, Crockmeter, and other similar useful models of textile testing, dyeing, printing, and finishing equipment. Persons who wish to donate or sell such equipment should contact H R Mauersberger at the College.

• AHA Accepts Leadership of Performance Standards Project

The American Hotel Association has formally accepted administrative leadership for the project just approved by the American Standards Association on performance standards for textile fabrics used by hotels, hospitals, and other institutions.

Clifford Gillam of the American Hotel Association has stated that the committee which will be in charge of the technical work is now being formed. All interested parties may ask for the right to participate in the project. Requests should be directed to either the American Standards Association, 70 East 45 Street, New York, N Y or the American Hotel Association, 221 West 57 Street, New York, N Y.

This new project will parallel the work done on the American Standards for Rayon, Acetate, and Mixed Fabrics, but will cover all fibers and mixtures, including the newer synthetics.

At the general conference in January, nearly 40 organizations representing producers, distributors, consumers and technical groups, participated in the discussions as to the desirability of such a project.

Under the new project, specifications, test methods, and performance requirements will be developed for fabrics used in the manufacture of such end-use products as: window curtains, draperies, slip covers, upholstery, awnings, table cloths and napkins, toweling—guest and utility, bath mats, shower curtains, bedspreads, decorative comforter and pillow covers, blankets, and uniforms for bellboys, porters, cleaning operators, waiters, waitresses, doormen and similar employments. Also, fabrics for coveralls, overalls, work shirts, and work trousers will be covered.

The project will be concerned with the serviceability of the textiles in their end use rather than the fiber content. The requirements will also include components (button, thread, etc) entering into the article covered, with respect to serviceability.

Also within the scope of the work will be the development of uniform methods of collecting samples for compliance tests and the establishment of methods of promoting the use of the specifications, test methods, and serviceability requirements for fabrics through suitable certification and labeling procedures and other means.

Speaking in behalf of the American Hotel Association, Mr Gillam said that it is essential for the hotel buyer at the time of purchase to know whether the item he purchases is launderable or dry cleanable, and how well it will stand without changing its characteristics after it has been refreshed.

• Gordon Research Conferences, AAAS, for 1953

The annual Gordan Research Conferences, sponsored by the AAAS, will again be held at Colby Junior College, New London, N H, from June 16 to September 4.

The Conferences were established to stimulate research in universities, research foundations and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of the scheduled lectures and free discussion groups. Sufficient time is available to stimulate informal discussions among the members of a Conference. Meetings are held in the morning and in the evening, Monday through Friday, with the exception of Friday evening. The afternoons are available for recreation, reading, resting, or participation in discussion groups as the individual desires. This type of meeting is designed as a means of disseminating information and ideas which otherwise would not be realized through the normal channels of publication and scientific meetings. In addition, scientists in related fields become acquainted and associations are formed which result in collaboration and cooperative effort between different laboratories.

It is hoped that each Conference will foster a free and informal exchange of ideas between persons actively interested in the subjects under discussion. The purpose of the program is not to review the known fields of chemistry, but primarily to bring experts up-to-date as to the latest developments, analyze the significance of these developments, and provoke suggestions as to underlying theories and profitable methods of approach for making new progress. In order to protect individual rights and to promote discussion, it is an established rule of each Conference that all information presented is not to be used without specific authorization of the individual making the contribution, whether in formal presentation or in discussion. No publications are prepared as emanating from the Conferences.

The first meeting of each Conference is held Monday morning at 9 A M, E D S T. The morning sessions, through Friday, are scheduled from 9:00 A M to 12:00 Noon. The second session of each day is held in the evening from 7:30 to 10:00 P M, Monday through Thursday. There are no Friday evening meetings. Conference members are expected to release their rooms not later than Sunday morning unless they have made a reservation for the next Conference.

Accommodations are available for a limited number of women to attend each Conference, also for wives who wish to accompany their husbands. All such requests should be made at the time of the request for attendance because these limited accommodations will be assigned in the order that specific requests are received. Children twelve years of age and older can be accommodated at Colby Junior College. Rooms are available at several inns and hotels in the area if reservations are made in advance.

Individuals interested in attending the Conferences are requested to send in their applications to the Director, on or before May 1, 1953. Each applicant must state the institution or company with which he is connected and the type of work in which he is most interested. Attendance at each Conference is limited to 100.

Requests for attendance at the Conferences, or for any additional information should be addressed to W George Parks, Director, Department of Chemistry, University of Rhode Island, Kingston, Rhode Island. From June 15 to September 1, 1953, mail should be addressed to Colby Junior College, New London, New Hampshire.

Program for the 1953 Textile Conference

George S Buck, *Chairman*

July 13—JOHN A HOWSMON—"The Evaluation of the Submicroscopic Structure of Fibers". LEON SEGAL—"Decrystallization of Cotton Cellulose."

July 14—R J ANDRES—"Pressure Dyeing of Man-Made Fibers".

July 15—PAULINE BEERY MACK—"Recent Developments in the Science of Textile Maintenance." HERMAN BOGATY—"Chemical, Physical, and Physiological Characteristics of Blended Fabrics".

July 16—MYRON J COPLON—"Influence of Temperature on Certain Tensile Properties of Various Textile Fibers". "Chemistry of Polymerization of Acrylics." (Speaker to be announced)

July 17—D J MONTGOMERY—"Generation and Conduction of Electricity in Fibrous Materials."

• Delta Kappa Phi Convention

The annual convention of Delta Kappa Phi, reputedly the oldest textile fraternity in the United States, will be held in New Bedford, Mass, April 24-25.

Activities will begin Friday evening, April 24, with a smoker at the New Bedford Driving Club for delegates and members of Delta active.

On Saturday, a tour of New Bedford Textile Institute will take place in the morning, followed by a business meeting at Carpenters Hall at 1:30 P M. A banquet will be held in the evening at Marion Steak House on the outskirts of New Bedford.

A Ward France, Supreme Consul, advises alumni members to make reservations through the active chapter.

• Barrett Acquires Synvar Resin Plant

Barrett Division, Allied Chemical & Dye Corporation announced March 4 that it had acquired the Greensboro plant of Synvar Southern Corporation. The plant comprises facilities for manufacture of urea-formaldehyde resins.

Barrett stated that it would continue to make the same grades of resins as have heretofore been supplied by Synvar Southern Corporation to the furniture and textile industries.

• LTI Summer Session

Six one-week courses, ranging from fabric identification to applied electronics, will be held at the Lowell Textile Institute summer session to be held in June, according to an announcement by Prof Ernest P James, director.

The courses and the dates they will be held follow:

Fabric identification, synthetic fibers, applied microbiology, textile testing survey, June 15-June 19; interpretation of data, applied electronics, June 22-June 26.

A fee of $50 will cover tuition and supplies, while rooms will be available in residence halls on the campus for $10 a week. Cafeteria service will be available.

TECHNICAL LITERATURE

(All literature indicated in this section is available upon written request to the specified company or organization unless otherwise indicated.)

Interscience Launches New Manual Series

With the publication of W L Gore's book on *Statistical Methods for Chemical Experimentation,* Interscience Publishers Inc, New York and London, have embarked upon a new publishing venture, the *Interscience Manuels.* These low-priced volumes are primarily designed as reliable tools for laboratory procedures. At the same time they set out to help technicians and research workers with the evaluation and recording of their experimental results. Emphasizing techniques, these manuals will furnish in about 200 pages a proper selection of classical and instrumental methods by following the critical recommendations of the authors. Particularly geared for beginners, they will provide sound, up-to-date guidance, it is stated.

The *Interscience Manuals,* issued in standard format, are scheduled to be published at irregular intervals. So far, about four volumes are planned annually. The series is not confined to any particular science or technology. It stresses, however, a wide range of problems pertaining to the research and industrial laboratory. Among the titles in preparation are: Chromatography, Insecticides, Lubricants, Detergents, Ion Exchange, Microfilm and Microcards, and Fiber Microscopy.

Lustrex X-820

Product Development Dept
Plastics Division
Monsanto Chemical Co
Springfield, Mass

Bulletin and data sheet give revised information.

Still in the development stage, Lustrex X-820 is finding broad application in organic and water systems. It is reportedly being used successfully as a film-forming vehicle, thickener, binder, emulsifier, protective colloid, dispersing agent, antiblocking agent and modifier for natural water soluble materials.

New Procedures in X-2 Application

Chemical Development Div
Dan River Mills
Danville, Va

A second supplementary bulletin on the procedures and formulas for the application of X-2 chemical to rayon and rayon-blend fabrics.

This latest technical service bulletin shows that some steps in the procedure have been eliminated and others shortened, with savings in labor, time and expense, without affecting the results in the finished fabric. For example, procedures have been worked out which either avoid entirely, or greatly modify, the preliminary souring operation which was heretofore rated an essential step.

The new procedures render obsolete much of the technical data set down in the initial bulletin of July 15, 1952, and of the supplementary bulletin of August 31, 1952.

Uses of Persulfates

Bulletin #34
Buffalo Electro-Chemical Co, Inc
Station B, Buffalo 7, N Y

A collection of literature references pertaining to various uses of persulfates. The references, mainly taken from *Chemical Abstracts* and covering the period from 1907 to 1950, have been selected to show the highly diverse uses to which persulfates may be put, and to stimulate interest in this class of peroxygen chemicals. Complete coverage of the literature in this field was therefore not attempted.

Among the fields covered are the adhesives industry, biological chemistry, cellulose chemistry, fur bleaching, fur carroting, organic reactions, photographic chemistry, polymerization and depolymerization, rubber industry, soap industry, starch liquefaction, textiles, and miscellaneous. Approximately 100 references are cited.

Caustic Soda Booklet

Wyandotte Chemicals Corp
Michigan Alkali Division
Wyandotte, Michigan

Contains data on grades of caustic, manufacturing processes, analytical methods, shipping, procedure for billing, freight rates, unloading and handling precautions, containers, materials of construction for storage tanks, pipe lines, pumps, etc, for the handling and storage of caustic soda.

"M B" C P Latex Compounds

Montgomery Bros, Inc
Penrose & Packer Aves
Philadelphia 45, Pa

Covers the use of latex compounds in backing pile fabrics, cotton rugs and flat goods.

In addition to listing the advantages of "C P" (custom processing and controlled penetration) the folder gives general information and descriptions along with specifications for wet and dry films for each of the above applications.

GAF Bulletins

Commercial Development Dept
General Aniline & Film Corp
435 Hudson St, New York 14, N Y

General Aniline & Film Corp has announced the availability of two new bulletins, one on PVM (Polyvinyl Methyl Ether) and the other on Propargyl Alcohol (2-Propyn-1-ol).

The 12-page bulletin on PVM suggests uses in the textile, paper and surface coating fields, among others.

Propargyl Alcohol, a versatile chemical intermediate, is of interest because of the three reactive centers in its structure. A stable, moderately high-boiling liquid, it has a hydroxyl group, a triple bond, and an acetylenic methine hydrogen, which are said to be capable of the typical reactions of their classes.

Revised Standard Wool Grade Index

United States Testing Co, Inc
1415 Park Ave, Hoboken, N J

The recent demand for the Standard Textile Moisture Regain Index has prompted the reprinting of the Wool Grade Cards. The revised cards show the grades based on micron diameters and top numbers. In addition a chart showing fiber diameter distribution of standard grades and substandard grades, is included.

Distillation Technique

Dechema
Frankfurt/Main, Germany
Price: DM 28.40

This latest number in the series of "Dechema Discussions" contains 71 pages, size DIN A 4, printed on one side only with 73 illustrations. The discussion which was started in a previous number entitled "Laboratory Technique of Distillation and Rectification" (55 pages size DIN A 4) is contained in this number. K Thormann successfully coordinates the many and varied techniques in this field of chemical engineering which have appeared in the literature on the subject. A valuable reference book for chemists and engineers engaged in the design and operation of distillation apparatus and plant, the publication contains the answers to many questions in this specialized field.

A short introductory survey is followed by a definition of the basic principles, as laid down in DIN Sheet 7072, and the usual formulas are explained. Other sections are entitled "Principles of Distillation and Distillation Apparatus" and "Methods of Distillation and Specialized Distillation Processes." A comprehensive source list and index concludes this number.

Uses for Demineralized Water and Water Analysis Study

Barnstead Still & Sterilizer Co Research Dept
148 Lanesville Terrace, Forest Hills
Boston 31, Mass

This 11-page report gives comprehensive information on the uses and advantages of demineralized water in manufacturing and processing operations.

Stainless Steel Tanks

Bulletin #153
Rodney Hunt Machine Co
53 Mill St, Orange, Mass

In this bulletin showing the range of Rodney Hunt-engineered stainless-steel fabrications, particular attention is given to stainless steel tanks of standard and special construction in a wide range of sizes from small vessels to complex equipment for textile, paper, chemical and other industries. A simplified quotation request sheet with detailed standard specifications is included.

ASTM Standards on Textile Materials

American Society for Testing Materials
1916 Race Street, Philadelphia 3, Pa
$5.00 per copy, 660 pages, heavy paper cover

The October, 1952 edition of this compilation includes in their latest form 99 specifications, test methods, and tolerances developed by the American Society for Testing Materials Committee D-13 on Textile Materials. Considerable other related material is given.

Standards cover: general fibers, fabrics, yarns, threads and cordage. Also identification, qualitative, and quantitative analysis; and resistance to insect pests and microorganisms. General test methods cover testing machines, humidity, and interlaboratory testing. There are tests on stretch and snag resistance of hosiery, and a recommended practice for the designation of yarn construction.

Extensive sections give photomicrographs of common textile fibers and photographs of defects in woven fabrics; a glossary of textile terms, and terms relating to hand of fabrics. Included are technical papers by Robert R Jones and Thomas F Evans, entitled respectively, "An Application of Statistics to Quality Control in the Textile Industry" and "Statistical Considerations in Fiber Research."

Appendices cover basic properties of textile fibers, a psychometric table for relative humidity, and a yarn number conversion table. Also, proposed methods of test cover evaluation of properties related to the hand of soft finished woven fabrics, accelerated aging of textiles, estimating the clean wool content in wool in the grease, and fire retardent properties of treated felt. Other appendices cover proposed recommended practices for calculating number of tests to be specified in determining average quality of a textile material and fineness of cotton fibers by resistance to airflow by Arealometer Method and Micronaire Method.

A convenient table of contents is included (by subject and ASTM serial designation) and an extensive index.

Eco Allchem Pumps

Eco Engineering Company
12 New York Avenue
Newark 1, N J

Full information on the entire line of Eco Allchem pumps is provided.

Equipped with chemically inert teflon impellers, a teflon-packed stuffing box and a choice of teflon or graphitar self-lubricating bearings, these stainless steel pumps reportedly move fluids at pressures to 70 psi. With a low corrosion rate, Eco Allchem Pumps are said to be among the lowest-priced quality units for safely handling corrosive and hazardous fluids, such as nitric acid, hydrogen peroxide, etc.

The pumps are self-priming for nonvolatile fluids and provide a high suction lift over wide temperature and viscosity ranges.

Cachalot Fatty Alcohols

M Michel & Co. Inc
90 Broad St, New York 4, N Y

This newly revised data sheet lists typical analyses for 14 types of Cachalot brand cetyl, oleyl and stearyl alcohols, including NF, USP, technical and commercial grades used in the textile chemical industry.

Honeywell Literature

Minneapolis-Honeywell Regulator Co
Brown Instruments Division
Station 4, Wayne and Windrim Aves
Philadelphia 44, Pa

HONEYWELL CUT-OFF RELAY

Bulletin 8504 describes relay designed for use in electric control circuits to shut down the process when a predetermined control point has been reached. Bulletin contains application and operational data, specifications, and installation information.

INSTRUMENTATION DATA SHEET NO. 29.0-3

A new data sheet (29.0-3) released by Honeywell, describes instrumentation and uses of the Waco rotary gravity filter. The information in this sheet is of particular interest to those industries, where large sewer effluents require an effective means of reducing stream pollution and recovering valuable products.

PNEUMATIC BUTTERFLY CONTROL VALVES

Bulletin 8503 describes butterfly valves designed to regulate the flow of air, gas, liquids or steam in conjunction with indicating, recording or non-indicating penumatic controllers. Bulletin contains application data, specifications, dimensions, sizing data.

Penfield M A Models—Fully Automatic Mono-Column Demineralizers

Penfield Manufacturing Co, Inc
19 High School Ave
Meridan, Conn

This sheet consists of a photograph and schematic diagram on the front, and a detailed description of parts, sample specifications and performance data on the back.

The special feature of the new Penfield MA Model is the automatic performance of all functions, including the regeneration cycle. Whenever the effluent's conductivity (purity) falls below pre-set standard, the treated water is automatically discharged and signals indicate the need for regeneration. Turning a switch then puts the unit into its regeneration cycle, including rinsing and re-cutting in effluent when desired purity standards are reached and refilling regeneration tanks with fresh water in preparation for the next required regeneration cycle.